RULES FOR RECOVERY FROM TUBERCULOSIS

LAWRASON BROWN · M · D ·

John Tempest Walker.
Saranac Lake - June 18, 1924 -

RULES FOR RECOVERY

FROM

PULMONARY TUBERCULOSIS

A LAYMAN'S HANDBOOK OF TREATMENT

BY

LAWRASON BROWN, M.D.

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It has been deemed wise to omit illustrations from this book. The reader is referred to the "Journal of the Outdoor Life," wherein many if not all of the articles mentioned in this work are to be found fully illustrated.

PREFACE

THAT a fourth edition of this little book should be called for indicates apparently that many patients like to have some explanation, more or less logical, why certain rules should be followed. If it has helped the conscientious patient to avoid blunders, so easily made at first through ignorance, but so apparent to any patient who knows the game, it has served its purpose. It was written primarily for the author's patients, for the mild and pleasurable excitement of human intercourse deflects at a thousand angles the train of thought, and many important details may not be sufficiently emphasized or may be overlooked entirely. It is not the author's intention that the book should be hastily read and laid aside, like the modern novel, but he believes that it should be read slowly, chapter by chapter, day by day. When it has been carefully read in this manner, he hopes it will be used as a book of reference, a handbook, so to speak, of the fundamental principles of the cure. He has attempted to make clear the whys and wherefores of many rules ordinarily given to patients

in an oracular manner, for he believes that the day has come when the physician should look upon the patient, not as an ignorant child, but as a human being endowed with more or less mature intelligence; as one, in fact, who has a right to demand an explanation of the way certain effects follow certain causes. The physician of today must teach as well as serve; or better, he must teach in order to serve most intelligently. There may be a few patients who are willing to do what they are told without thinking about the matter, and for these, explanations may possibly for a time be unnecessary. An attempt has thus been made "to stimulate interest, to impart knowledge," to train the subconscious, and so to form and strengthen character.

A number of changes have been made. The Summary has been placed at the end of the book, and a new Introduction written. Vitamins have been briefly discussed. New weight charts replace the old, and weight charts for children are added. A number of new suggestions have been made in the chapter on Foods. Changes too numerous to mention have been made here and there throughout the book in an attempt to keep it abreast of modern knowledge.

The writer owes much to his colleagues and patients at Saranac Lake, and elsewhere, from whom he has borrowed expressions, similes

and ideas. No words can adequately express his indebtedness and his affectionate gratitude to Dr. Trudeau, the pioneer in the art of imparting advice to tuberculous patients. Without his aid and stimulus and that of his associates this little book of rules could never have been written.

L. B.

Saranac Lake, 1923.

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"Suppose it were perfectly certain that the life and fortune of every one of us would, one day or other, depend upon his winning or losing a game of chess . . . Yet it is a very plain and elementary truth that the life, the fortune and the happiness of every one of us, and more or less, of those who are connected with us, do depend upon our knowing something of the rules of a game infinitely more difficult and complicated than chess. It is a game which has been played for untold ages, every man and woman of us being one of the two players in a game of his or her own. The chessboard is the world, the pieces are the phenomena of the universe, the rules of the game are what we call the laws of Nature. The player on the other side is hidden from us. We know that his play is always fair, just and patient. But also we know, to our cost, that he never overlooks a mistake, or makes the smallest allowance for ignorance. To the man who plays well, the highest stakes are paid, with that sort of overflowing generosity with which the strong shows delight in strength. Anyone who plays ill is checkmated—without haste, but without remorse."

INTRODUCTION

THE idea of disease that many hold is gained entirely from the picture of disease as it is presented by two great acute diseases, pneumonia and typhoid fever. The crisis in pneumonia is rarely delayed more than seven or eight days, and the patient has usually passed the danger point in typhoid fever by the end of the fifth or sixth week. After a more or less rapid convalescence the former patient can resume his usual activities, strenuous though they may be, without any danger of relapse. In opposition to these acute diseases stand Bright's disease, syphilis, heart disease, chronic joint disease and tuberculosis. In contradistinction to the acute diseases which last but a month or two, those which persist for a year or longer are called chronic diseases. The term "chronic" does not imply that the disease is incurable, but simply that it lasts a longer time than the acute disease. A person ill with pneumonia or typhoid fever takes little interest in his surroundings, and often prefers to be let alone. The duration of the disease and its convalescence is so short that it is possible for the physician and nurse to guard the patient closely until he can be discharged cured. It is at once readily seen

that such treatment in a "chronic" disease which covers many months, during a large part of which the patient is to all outward appearances perfectly well, cannot be followed. For months, for example, in pulmonary tuberculosis, the patient must depend largely upon his own knowledge of what he should do, of what he should avoid, in order to make his recovery permanent. He must be familiar to a certain degree with the treacherous course of the disease in order to avoid being misled by that rather prolonged period of well-being, termed by some the period of false convalescence, the danger time in tuberculosis, before the scars in his lungs justify him in resuming his ordinary activities in life. Furthermore it is impossible for either the physician to recall all the details that it is necessary for the patient to know, or, indeed, for the patient to remember—the thousand and one details—unless he can have them beside him for constant reference. To prevent many mistakes of omission on the part of the physician, and of natural forgetfulness on the part of the patient, many facts that the patient should know as soon as possible are presented in the following pages.

The Treatment of Pulmonary Tuberculosis

The treatment of pulmonary tuberculosis today is based upon four fundamental points:

1, Rest; 2, Good Food; 3, Fresh Air; 4, Education. The following theses which could be successfully defended are of interest:

1. In proportion as you can give any part of the body functional rest, so you can aid in its recovery from tuberculosis.

2. The least amount of food that will enable any patient who is underweight to gain up to and slightly beyond his normal weight, is the optimum diet for that patient.

3. Recovery from pulmonary tuberculosis is directly dependent upon seven or eight hours a day in God's open, fresh air, and upon good ventilation the remaining hours.

4. In any chronic disease like pulmonary tuberculosis education of the patient will contribute about as much to his recovery as rest, good food and fresh air.

I

ON REST

"Repair is but the repetition of growth. The same elements, the same kindred conditions, are necessary to the same results. Rest is the necessary antecedent to the healthy accomplishment of both repair and growth."

THERE are three great medicines in the treatment of tuberculosis; medicines which when rightly used are far superior to those found in any pharmacopœia: Rest, food and fresh air. Formerly this order of their importance was reversed and the value of fresh air and food so emphasized that rest was placed last, hyphenated often to exercise and modified by "properly regulated." Thus the great profit that accrues from rest at the beginning of treatment was often slurred over or, indeed, entirely escaped attention. The value of rest at the outset of treatment cannot be overemphasized, and for that reason is discussed first, because to give a patient with pulmonary tuberculosis and fever, good food and insufficient rest is like attempting to fill with water a barrel full of holes.

The importance of exercise to the healthy body has been dwelt upon from time immemorial, and while the idea of exercise for health's

sake will never exert upon Americans so much influence as, for example, it does upon the English, nevertheless it is rare for any patient to undergo the rest treatment without protest; his organs, he states, will not perform properly their functions. He has never tried resting out of doors, yet hundreds of patients can testify that such rest when the body is weakened begets, not further weakness, sluggish digestion and elimination, but greatly increased strength.

Few realize how important a place rest occupies in the life of the healthy man. The experienced ditch-digger pauses before lifting each shovelful of earth, while the beginner throws out three times as much for the first few minutes and is then exhausted and requires, according to some experiments, two hours for complete recovery. Any attempt to use muscles so fatigued greatly prolongs "this period of complete recovery—a fact that demonstrates the injurious effect of straining a fatigued muscle." (Howell.) When the nutrition of the body is poor, whether brought about by disease, poor or too little blood, loss of sleep or mental activity, the muscular power is lessened. It is interesting to note that continued use of one set of muscles, (*e. g.*, those in walking) decreases the work obtainable from other sets, (*e. g.*, the arm.) The heart, which is a muscular bag, contracts so rapidly that few of us realize that between beats it rests at least twelve hours in twenty-four. Everyone has noticed that exer-

cise produces deeper and more rapid breathing, due no doubt to the fact that the used muscles require more oxygen.

To understand fully, however, the value of rest and exercise for the body, in either health or disease, it is necessary to become acquainted with a few physiological facts. The amount of work performed by any animal is the product of the units of weight by the units of distance they are lifted perpendicularly. For man these units are the pound and the foot, and the unit of work is the foot-pound, *i. e.*, the energy required to lift one pound one foot. A normal heart does four foot-pounds of work at each contraction. If, as is often the case, the pulse is quickened, during exercise, twenty beats per minute, it is evident that exercise for one hour would cause the following increase of work for the heart: 20 beats × sixty minutes × 4 foot-pounds equals 4800 foot-pounds of work, equal in amount to that required to carry two scuttles of coal up to the third or fourth floor. Rest prevents this expenditure of energy. In a similar manner the number of respirations may be increased four or more per minute or two hundred and forty in an hour.

Every living thing seems to require rest, or at least goes through periods of rest and of activity. Sleep for many men is the only time given to rest. During sleep the heart, lungs and kidneys continue to function but become less

active. The muscles, however, relax completely and loss of consciousness occurs, due probably to lack of blood in the brain, brought about by the fatigue of the small muscles that keep the bloodvessels of the skin and abdomen contracted. The average healthy man spends about one-third of his life in bed—if not in sleep.

Injury demands rest for repair. Pain in many cases is thought by some to be the gift of a kind Providence to enforce rest of an injured part. Pain has been called the monitor, and rest the cure. "In every movement of the body whenever one begins to endure pain it will be relieved by rest." No one attempts to walk on a broken leg or to wiggle a finger with a skinned knuckle in order to hasten recovery. When the pleura (the covering of the lung) is inflamed it tries to protect itself by the secretion of substances designed to guard it against direct friction. When such inflammation of the pleura (pleurisy) occurs, whether from pneumonia, a broken rib or tuberculosis, recovery is quickest wrought when rest is most vigorously applied. The pain of pleurisy causes the ribs and the diaphragm to move less, in order to protect the lung and pleura against injury from respiratory exercise. Even the deeper breathing caused by talking may irritate such a pleura. The fixation of inflamed joints by contraction of the muscle about the joint is known. A boil or an abscess is opened to give its internal surfaces rest. It has long

been known that rest in bed aids wonderfully a heart weakened by disease. Exercise may, on the other hand, help some individuals; but when fatigue quickly sets in following exercise, and loss of appetite, of weight, of strength or weakened digestion, fever, night-sweats, increased cough and expectoration occur or increase, are we to believe that exercise is of value? Exercise demands increased nutritive aid, while in this state of ill-health it is lessened, and, before the loss can be repaired, a new demand with added loss follows. "Every motion costs the body fat or protein; climbing more than walking, walking more than sitting and sitting more than lying. The more quietly the body lies, the less the muscles are called into use, the less is the body substance used." (Cornet.) It is of interest to note that a semireclining position (three or four pillows if in bed, an angle of 30 degrees in a chair) is believed to be the best position for the majority of cases. Such a position aids in resisting cold, as the heart has less work to do against gravity. The excessive demands upon the body in tuberculosis have led to excessive waste of body substance and given rise to the popular name "consumption." The conservation of body substance is obtained through rest. The expenditure must be reduced while the receipts are increased.

Many patients argue that as they have no appetite they must exercise in order to regain

it. Unfortunately, in pulmonary tuberculosis this quickens the circulation, forces more poison into the blood, weakens the digestive organs, brings about less appetite still and loss of strength and weight. It produces what is known as a vicious circle. Prolonged rest and its dangers have been studied very carefully in patients who have diseases of the joints. One observer states that he has never seen a patient with severe hip disease whose general health was not improved by rest in bed. Curiously enough, rest of the knee which is necessitated by proper treatment of the hip does not injure the knee. The enforced rest necessary to enable the lungs to wall off the spots of disease and to dam up their poisons need cause no uneasiness in regard to the other organs.

A thesis might be successfully defended which states that in proportion as any part of the body afflicted with tuberculosis can obtain functional rest, so it can be cured speedily and surely. Tuberculosis of the knee, on the one hand, is, when taken in time, very curable, for it can be given 100 per cent of functional rest. Tuberculosis of the kidney, on the other hand, is much more difficult to cure, for it performs its duties day and night and can be given no functional rest. The lungs occupy an intermediate position, and while they must function to maintain life they can be spared very greatly. One observer has limited the pulmonary movement of one lung of some rabbits, and then infected them with

tuberculosis germs. The disease in the quieted lung was far less acute than in the other more active lung. It is unquestionably dangerous to stretch tuberculous disease areas, and experience with cattle shows that pulmonary rest is of value. The amount of lymph (the tissue juice) that flows through the diseased area supplies food to the tubercle germs and washes away their waste products which may tend to stop their growth. Rest limits the flow of lymph and so aids in certain stages in healing.

It is conceivable that stretching the arms above the head may in health cause some movement of the chest wall over the lungs. In many cases of pulmonary tuberculosis the lung is firmly attached to the chest wall, and it is possible that the stretching referred to may bring about some stretching of the delicate scar tissue, and so spread the disease. This, of course, relates only to the movement of the elbows and not to the forearms. Hanging by the arms is without doubt dangerous.

It is of some interest at this time to consider briefly in a broad way how recovery from pulmonary tuberculosis takes place. The minute dots of disease in the beginning are scattered through a small part of the lung much as specks occur in an unsound apple. In those minute dots lie the germs which give off poisons to weaken the body. On the other hand, the body is trying to wall off, to imprison, the germs by

forming scar tissue about them. At first this scar tissue is very, very delicate, possibly not stronger than spider web. A deep breath, a sudden exertion which causes us to shut our windpipe and contract our chest muscles, may readily stretch or break this delicate scar tissue and so allow the germs to escape. These escaped germs may form new dots of disease, and the walling-off process must begin anew. Recovery from tuberculosis then consists, first, in walling off the diseased areas and, second, in maintaining the wall in such a state of perfection and strength that no germs can escape, so that even their poisons are dammed up and that finally the resistance of the body becoming so strong the germs are starved to death. That this requires much time can be readily understood.

The time that should be devoted to rest and the degree of rest varies, of course, with each individual and must be prescribed by his physician. In early stages, when the disease has just been discovered, the best treatment is without doubt rest in bed. When high fever is present the patient should be allowed for a time to move neither hand nor foot, writing must be forbidden and reading greatly curtailed, if permitted. It may even be advisable for a time to feed the patient. All excitement must be absolutely avoided, for anything that quickens the pulse and accelerates the circulation may flush out of the poorly walled-off diseased areas poisons

which cause fever, loss of appetite, loss of weight and strength, night-sweats, indigestion and possibly constipation. Bathing should be performed so as to avoid tiring the patient. A garrulous nurse, who relates all the fatalities and sad experiences that have fallen within her notice, should be discharged at once, for harrowing stories have no place in a sick-room.

In any case, however, whether or not there is fever, a patient is never injured by a six weeks' rest in bed, but often so greatly benefited that he feels profoundly grateful for the advice which brought it about. The time of greatest improvement in many cases occurs during the period when the patient, having lost his fever, still remains in bed. The idea that some patients have, that should they "give up" and go to bed, they would rapidly lose what little strength they have, is wrong. Many patients can testify that such is not the case, but that they get up feeling stronger in every way. Few people go to bed without being sick, and it is in nearly every case the disease and the fever which cause the weakness and not the rest in bed. Were it not for this rest in bed, many patients would die from such acute diseases as typhoid fever and pneumonia. Many instances could be quoted, showing the great improvement that occurs from resting in bed. One patient, a man of forty, active and athletic, was put to bed after a rather strenuous journey. At the end of several weeks he had

made such improvement that he elected to remain in bed eleven weeks and got up without a symptom and has remained so for over eight years. Another patient rebelled on the day of his arrival against going to bed. The following day he spat blood, ran fever and was in bed for nearly three months. He arose practically symptomless and has remained so for many years. Another patient never improved until he broke his leg and was forced to remain in bed for many weeks. The enforced quiet effected an excellent arrest of the disease. It might be noted here that for many patients the most effectual treatment of cough is rest in bed.

While the writer is firmly convinced that a preliminary rest in bed will more quickly and more surely wall off the disease and so arrest it, he also recognizes that the vast majority of patients who do arrest their disease, do so by remaining in their "cure-chairs" until put upon exercise. The object of this chapter, however, is not to tell how most patients who arrest their disease do so, but to guide patients along lines that will bring about the best results in the greatest number. That tuberculosis can be "cured" without any interruption of business or work cannot be denied, but that the vast majority of patients who attempt to attain arrest in this way fail to do so cannot be gainsaid.

When a patient decides that he will risk remaining up at the beginning of treatment, he should

avoid for at least two months all unnecessary movements, such as packing up to go to a health resort, climbing stairs except when absolutely necessary for the cure, all games like pool, billiards, cards or any games of chance, all sports, and only such walking as is absolutely necessary should be indulged in. The risk should be fully realized, and the responsibility assumed by the patient who, if the plan fails, must pay the penalty.

How long a patient should remain in bed depends entirely upon his condition and symptoms, points which only his physician can decide. It might be of interest to the patient to have it suggested that in most cases it is easier for the physician to have the patient come to his office than for the physician to visit the patient. The physician experiences little pleasure from keeping his patients in bed but he realizes that in this disease the bed is a great medicine, which can heal by itself alone many attacks of illness. If by remaining in bed a few weeks a patient can shorten his time of treatment by several months it is time well spent. He should remember that a cut in diseased skin will not heal as readily as a cut in healthy skin. If patients could only see the disease in their lungs, the slow progress that is often made toward healing, it would be difficult to persuade many of them to take any exercise for a long, long time.

A further argument for rest in bed at the onset of treatment is that at first some patients make grievous mistakes through sheer ignorance, but protected from such mistakes by rest in bed they acquire such knowledge of the disease during this period that when they get up the danger through ignorance is passed.

In this connection it is of some interest to consider two methods of treatment formerly much used: Horseback riding and sea voyages. Of all former modes of locomotion, moderate in expense, these entailed upon the traveller the least exercise and afforded him the greatest amount of fresh air. The small size of the ships, the length and monotony of the voyage, forced unconsciously upon many a patient more pulmonary rest than he had ever before experienced. So, too, with horseback riding. It spelled out of doors, and when taken moderately afforded far less pulmonary exercise than walking, which has led many a patient to sure destruction.

Few realize the amount of energy expended in coughing. Fortunately for most patients the muscles used in coughing are well developed. Some years ago an enterprising observer estimated that a patient who coughs hard all day does as much work as a man who climbs a mountain. However accurate this may be, the work done by many patients in coughing is so severe and exhausting that every means must be taken to check it. That all coughing, whenever pos-

sible, should be controlled, on account of possible pulmonary injury, is apparent to everyone.

Eight hours of sleep are said by many to be sufficient for a man in health. It has already been pointed out that during sleep the muscles relax completely, and such a state of relaxation is during waking hours only approximated by rest in a chair. We hear much today of conservation of natural resources, but few realize how important in disease and even in health the conservation of energy is. Many men with arrested or even only quiescent disease in their lungs are enabled by a study of the conservation of their efforts to work and live for years in comfort, though dubbed no doubt by their fellows as "cranks on rest." The eight hours in bed for many men with arrested disease who must work, should be stretched to ten or eleven, and rest in bed from Saturday night to Monday morning enables many to return to work with a vigor that is surprising. Rest for a half hour before each meal is helpful to many patients, and for some with weak digestion a rest for a half hour after meals is remarkable in its results. During the "cure" period a rest of two hours following luncheon should be rigidly adhered to and every effort made to sleep. When this is not possible a light, non-exciting book or periodical can be read, but all games and conversation should be avoided.

The tuberculous patient is in most cases a

nervous patient as well, for the poisons of the disease show a peculiar characteristic of attacking the nervous system. Dr. S. Weir Mitchell was the first to prove the great value of rest for nervous patients and in many instances it is remarkable to see how relaxation from nervous tension follows rest, while recuperation treads close upon its heels.

II

ON FOOD.

"Good food, spiced with laughter, eaten with contentment, digested at ease, turns sour visages into sweet, bad health into good."

Food is said to stand in more or less the same relation to the body that fuel (coal or oil) does to the steam engine or gasoline to the motor, *i. e.*, it supplies the engine with power. However, food does more than this for the body. It not only supplies fuel and oil, but repairs the parts injured in the wear and tear of life. The engine burns the coal and, if it is good coal, few clinkers clog the grates. We can vary our food at will, but seldom do we consider the final purpose of food, and think only of how it suits our palate. Few of us live only to eat; but, until we fall ill, still fewer have ever eaten to live. This is the problem that we must now face and solve as quickly as possible.

Two questions present themselves at once: First, what shall we eat and, second, how much shall we eat?

Some of the brightest intellects of our time have studied this problem very carefully. They have noted the amount of food necessary for

men undergoing hard, moderate and light labor as well as for those engaged in sedentary work. The result is what we would suppose—the necessity for food increases with activity.

NUTRITIVE INGREDIENTS OF FOODS (BASED ON ATWATER).

- Food as purchased contains
  - Edible portion, *e. g.*, flesh of meat, yolk and white of eggs, wheat, flour, etc.
    - Water
    - Nutrients
      - Proteins
      - Fats
      - Carbohydrates
      - Vitamins
      - Mineral matter
  - Refuse, *e. g.*, bones, entrails, shells, bran, etc.

Protein forms tissue, *e. g.*, white (albumen) of eggs, curd (casein) of milk, lean meat, gluten of wheat, etc.

Fats are stored as fat, *e. g.*, fat of meat, butter, olive oil, oils of corn and wheat, etc.

Carbohydrates are transformed into fat, *e. g.*, sugar, starch, etc.

All serve as fuel to yield energy in the forms of heat and muscular power

- Nutrition essentials (vitamins)
  1. Fat soluble A
  2. Water soluble B
  3. Water soluble C

  Lack of these prevents growth and produces deficiency diseases, scurvy, etc.

Mineral matter (ash).....Share in forming bone, assist in digestion, etc.
e. g., phosphates of lime, potash, soda, etc.

All foodstuffs may be divided into seven great classes: Water, inorganic salts, nutrition essentials (vitamins), protein, albuminoids, carbohydrates and fats. A few examples of some of these foods will illustrate them better than many pages of description.

Nature's call for water is usually early and imperative, and no one doubts its great value. The amount of water necessary for different individuals varies greatly, but many, especially women, drink too sparingly. The practice of taking water at meals has long been frowned upon, and on account of the weak stomach muscles in many patients it should not be overdone in those suffering from pulmonary tuberculosis. If, however, the stomach is not displaced and the muscles strong, water at meals is excellent. One rule, however, should be absolutely followed if water is taken at meals. It should be drunk only after the food is swallowed and not used to wash down food incompletely mixed with saliva. Water is of great help in many instances of constipation. Pure spring or tap water is just as valuable for this purpose as many of the bottled waters on the market. There is, however, one great difference. Tap water is free; we all have an unlimited supply of it. For this reason we regard it as of little value. Bottle it, give it a fancy name and charge for it by the gallon—and we drink it with marked benefit. Great is the power of suggestion!

Inorganic salts comprise combinations of sodium, potassium, calcium, magnesium, iron, iodine and probably others in combination with chlorine, phosphorus, sulphur, carbon and other elements. The most familiar of these is sodium chloride, or common table salt. The larger the part vegetables play in the diet the more salt is necessary, for many of these are deficient in sodium and chlorine. Iron is contained in comparatively large quantities in spinach, yolk of eggs, asparagus, beef, cabbage (green leaves) and apples, and it is well known that anemic persons should take iron. Many today are aware of the value of lime salts (calcium) in the coagulation of the blood and the curdling of milk, but that animals fed on a liberal diet free from these compounds die more quickly than those without any food is not so fully known. Calcium is used at times in the healing process in tuberculosis and forms as it were a limestone wall about the germs. For this reason foods which contain a relatively large quantity of calcium, *e. g.*, milk must not be avoided. These salts then are very important, but luckily we usually find most of what we need in our ordinary diet.

Anybody can tell that a cow is an animal, and a cabbage a plant, but when both animal and plant have such simple structures that they strongly resemble one another the problem is different. Now one of the fundamental differ-

ences between an animal and a plant is the fact that the plant can use nitrogen in the form of a simple chemical compound to build up its cells, whereas the animal requires the nitrogen to be in a very complex state or, in fact, in the final stage in which it is found in the plant. These highly complex bodies are called "proteins," and occur in considerable amounts in lean meats, eggs and milk, and in smaller quantities in certain vegetables, such as peas, beans, rice, potatoes, wheat and corn and in gelatin. These protein substances are absolutely necessary for life and can be replaced by no others. Recent studies have shown that they fall into three or four classes, according to their ability to maintain life for a time or continuously, to maintain weight or to aid in growth. It is only necessary to add that the proteins in meat, milk, rice and potato belong to the last or the highest and most important group.

The group of albuminoids is best represented by gelatin which is good food in that it spares or saves the proteins for other uses. By itself it cannot form any new body substances which contain nitrogen.

The carbohydrates are represented in our food chiefly by the starches (bread, rice, potatoes, etc.), and to a certain extent by the sugars. Most of these are changed to grape-sugar by digestion and as such are absorbed into our bodies. We have seen that food might be looked

upon as fuel for the human machine and have learned that the protein food is necessary for the repair and growth of the body. These carbohydrates really carry out much more closely the analogy of fuel. In the body they (as sugars) are burnt (oxidized) in the muscles during work (muscular contraction) and probably even during rest, for the muscles are rarely, if ever, absolutely relaxed. In this way they supply a large part of the heat of the body. It can easily be inferred from what has been said that the carbohydrates also supply a large amount of the energy of the body, possibly all the energy of the muscles. These are the main uses of this class of foodstuffs, but like the albuminoids they can also "spare" the proteins, *i. e.*, when the supply of starch and sugar is abundant less protein food is required. If this supply is in excess of the needs of the body it may be changed into fat and stored up as such. Recent work has called attention to the fact that excess of carbohydrates may cause deeper breathing and so retard recovery.

The fats of the food really require no definition. Fat is found not only in meat, but also in the many oils found in fish and in vegetables (cod-liver oil, olive oil, cotton-seed oil, peanut oil, etc.). Animal fats, especially cod-liver oil and butter, contain vitamins that vegetable fats such as nut margarine do not, and hence are much more valuable as foods. The fats also

furnish energy to the body, and, weight for weight, much more energy than the carbohydrates. We store fat in many nooks and crannies of the body, which when we fall ill and cannot eat, we draw upon to supply the energy to keep the necessary physiologic activities in action (the beat of the heart, the movements of breathing, etc.). So whenever our intake falls below our daily requirement of food we use or consume more and more of our body fat. When this has reached an advanced stage in tuberculosis, the disease is popularly called "consumption."

This brings us to consider briefly the fuel value of the foodstuffs. This has been studied outside and inside the body and the results expressed in heat units called calories, one of which represents heat enough to raise 1.056 quarts of water from 32° F. to 33.8° F. The fuel value of fat is greater than that of carbohydrates or of protein as ordinarily used in the body. For this reason fat and carbohydrates might be called the "fuel-foods." It is impossible for the body to make use of as much fat as carbohydrate, and consequently, as has been stated, the carbohydrates (starches and sugars) are the chief heat- and energy-producing foodstuffs. The body of a healthy adult man produces and gives off to the surrounding air about 2400 calories of heat in twenty-four hours. Now when the various foods are analyzed in regard to the various foodstuffs

they contain, it is not difficult to determine how many calories or how much heat they are capable of supplying to the body. Many tables have been compiled, and it is of interest to state a few facts regarding them. It is of interest to note that 1 gram of protein yields 9 calories and 1 gram of either fat or carbohydrate yields 4 calories. It has long been supposed that fat and carbohydrates were interchangeable in the diet but recent work and experience have shown that 75 grams of fat are desirable as a daily minimum while the figure for protein ranges from 70 or 80 to 125 or more grams. One hundred is a safe standard and more are required in cold than in warm weather. A patient with pulmonary tuberculosis may need for a time as much as 3500 calories of food for he may give off that quantity of heat. One glass of milk contains twice as many heat units (150) as one raw egg. A tablespoonful of fairly thick cream or a butter ball is equivalent to an egg, or to a cubic inch of many cheeses. Skimmed milk or buttermilk has half the caloric value of whole milk, whey about one-third. Twenty ounces (forty tablespoonfuls, about three tumblers) of beef-juice equal one glass of milk. A good slice of roast beef equals four and one-half to five raw eggs, if the fat and all are eaten; if the roast is very lean, it is equivalent to only one and one-half eggs. Lamb chops, turkey and roast ham have a higher value than chicken, while veal is much lower.

Two heaping tablespoonfuls of calf's-foot jelly equal about one egg.

A portion of salmon or roast ham is about equal to two and one-half eggs, but smelts and brook trout are very low in value. Raw oysters and clams are about equal, and twelve oysters contain the same number of calories as one egg. Soups, unless creamed, have a fairly low value and ten tablespoonfuls about equal one egg. Creamed soups are two or three times as valuable. Potatoes, white or sweet, green peas, mushrooms, corn, macaroni, boiled rice, oatmeal, are all valuable. Beets, cabbage, cauliflower, celery, cucumbers, parsnips and turnips have very much lower heat values. Bananas, grapefruit and grapes are high among the fresh fruits, and figs, prunes, dates and apricots among the dried. Whole-wheat bread is but little more valuable than white bread and less so than brown bread, gingerbread, frosted or layer cake. All pies have a high value, as well as bread and custard puddings. French dressing is one-half as valuable as mayonnaise or hollandaise. Nuts contain many heat units. Most drinks, such as tea, coffee, cocoa and lemonade, are valuable on account of their added ingredients.

Scientific workers have recently found that chemically pure foods, containing ample quantities of mineral salts, protein, fat and carbohydrates, may not promote growth in young animals nor maintain health in adults. Much work has

resulted in determining that growth and health depend upon several (four or five) substances whose chemical composition has not been definitely determined, which have been called dietary essentials, accessories or vitamins (from *vita*, life and *amine*, a nitrogen-containing body). One is found abundantly in butter fat, egg yolk, cod-liver oil, the leafy vegetables (spinach, beet tops, celery, "greens," etc.), liver and kidney (fat-soluble A), and a second is found in most foods, though lacking in polished rice and highly milled flour (water-soluble B). A diet deficient in the latter causes beriberi. The third is necessary to prevent scurvy. Any diet suitable for tuberculosis will contain ample quantities of these essentials. Such work as this proves once more that milk, no matter what it costs, cannot be dispensed with. Two pints of milk a day when 3500 calories of food are eaten will supply about 75 per cent of the necessary amount of the first mentioned vitamin, 63 per cent of the second and 65 per cent of the third. A salad composed of vegetables, fruit and leafy green food, and pot herbs, such as beet tops, cabbage, spinach, etc., will prevent any deficiency in food essentials necessary to growth and health.

It is of considerable interest to note in passing that it is a very difficult problem to devise a diet very deficient in vitamins for an adult who has sufficient means. Such experience shows the uselessness of many of the so-called vitamin substances now on the market.

Finally, it must never be forgotten that in many experiments animals especially susceptible to the deficiency of vitamins have been used, and that conclusions drawn from these may not be wholly applicable to man.

We have now seen that the relative heat values of food vary between wide limits, but we must not forget that many other factors enter into diet. Protein, we have seen, is necessary for growth and repair. Inorganic salts, which are vital for life processes, occur in whole wheat flour and in vegetables with slight heat value. Other compounds, some already described (vitamins), and probably others as yet undescribed, play an important role in nutrition. Lastly, in the choice of a diet, individual taste must often be the deciding factor, and foodstuffs of low heat value are often digested and assimilated by patients far better than others apparently more appropriate for their needs. Flavor, however, some believe, is not the "outstanding dietetic asset that some people would have us believe. If the stomach and intestines can only be cajoled into making the proper effort, the unsavory concoction can be digested just about as satisfactorily as the food mixture which makes a stronger appeal." Nor must it be forgotten that the diet must be well balanced, and only the patient's physician can do this skilfully.

In health the appetite is a safe guide to follow, but in disease, when the body needs food most,

the stomach craves it least. It is an old adage among patients with tuberculosis that they should eat once for themselves, once for the germs and once to gain weight. They meant by this that the diet should be greatly increased, and not only must three good meals but six glasses of milk and six raw eggs be swallowed every day. For many years it was thought that however well the patient might be eating at his meals, the milk and eggs must also be taken. Looked at from an economic standpoint, in many instances, this was a woeful waste. Let us see what the patient wishes to do! He has, for example, lost weight and his usual weight is about ten pounds below what a man of his height and age should weigh. His first object is to regain his lost weight, and his second to approximate or slightly exceed his normal weight. To do this he must eat, and the scales tell the story. The tendency is to overeat and the desire to gain weight quickly is strong, but the struggle is to be a long one and no organ must be impaired. Everyone who knows anything about a motor knows that too much gasoline decreases the efficiency of the engine and clogs it with unburnt carbon. A certain quantity of gasoline enables the engine to do its greatest amount of work; more gasoline decreases the amount of work. So it is within limits in the body. When more food is eaten than can be assimilated the excess may undergo putrefactive changes in the intestines, and far from helping, hinder the body in its struggle against disease.

The rule for the man under weight should be to eat as little food as he can in order to gain weight.

Three good meals a day, two or three glasses of milk (with or between meals), one or two eggs a day, cooked or boiled one minute or even raw, are often sufficient to add enough to his weight to bring him the gain wished for. As soon as this is brought about he should consider his stomach and dispense with eggs and milk. Sooner or later he will fall ill with a cold or acute bronchitis, lose a few pounds in weight, and can then, by adding milk and eggs to his diet, quickly regain his lost weight. Such a method will reduce gastric and intestinal disturbances to a minimum. There are no more difficult problems in the treatment of pulmonary tuberculosis than to make some patients gain weight and to help others to avoid digestive disturbances. Such subjects, of course, cannot be discussed here and must be taken up with the patient's physician.

The problem of food for those with a good appetite is simple, but poor eaters have a hard time. Such individuals should develop a food conscience, a conscience which compels them to eat a sufficient quantity three times a day. Habit in eating is for many no harder to cultivate than a fresh-air- or rest-habit.

During the course of treatment, it is not at all unusual for a patient to lose his appetite, and, in

fact, to have such a distaste for food that it becomes at times almost impossible to swallow anything that requires chewing. It might be stated, however, as Hippocrates has said, that it is easier to fill up with drink than with food; which means, in other words, that when a patient has completely lost his appetite and cannot eat, he can often take, and take easily, liquid food which he can drink without chewing. Such a diet without even a cracker to chew often restores a lost appetite.

In the first place, a liquid diet in the vast majority of such cases gives the patient many times as much nourishment as he has been able to take in solid form. So liquid diet does not lessen but increases the amount of food eaten.

The relative value of eggs and milk is difficult to determine. In tuberculosis milk is far more important as it contains very digestible proteins (which stimulate the absorption of other proteins), much fat, including a large quantity of the several dietary essentials (see p. 35), and much calcium, the importance of which has been mentioned. On the other hand the value of eggs had been recognized before the Jews were held in bondage in Egypt, where eggs were a sacred emblem. We too can utter with Pope Paul V, "Bless, O Lord, we beseech Thee, this Thy creature of eggs, that it may become a wholesome substance to Thy faithful servants, eating it in thankfulness to Thee, on account of

the resurrection of the Lord." The yolk is rich in fat and iron, and the white in nitrogen. It has been mentioned elsewhere that a cooked egg contains more nourishment than a raw egg. The reasons for this are that a raw egg fails to stimulate the gastric juices and resists them, it calls forth no bile and resists the intestinal juices. Fifty per cent possibly of the raw egg white passes through the intestine undigested, and may cause diarrhea and afford opportunity for the growth of harmful germs. As soon as it is coagulated (turned white and opaque), *e. g.*, by boiling one minute, it is easily digested and becomes a valuable food.

When milk and eggs can be partaken of freely, the problem is simple. Four quarts of milk (about sixteen glasses) a day contain about 2300 to 2400 calories, but few could ever drink so much milk, and it is questionable whether it would be advisable to do so if anyone could. We must seek some substitutes for much of this milk. One glass of milk contains 150 calories, and one egg 75 calories. For a time at least, when no solid food is eaten, it is not difficult to replace three glasses of milk by six eggs, preferably boiled one minute (they can be swallowed cold and whole). A cup of coffee or tea with sugar and cream contains about the same number of calories (156) as a glass of milk, and two such cups could replace two glasses of milk. A similar sized cup of cocoa could replace nearly

two more glasses of milk (279 calories). A plate of creamed soup (250 calories) would more than replace a glass of milk. This suggests how a liquid diet may be arranged when milk and eggs are readily taken. When such is not the case, a physician will have to prepare a suitable liquid diet, but the problem is not an easy one.

Students of diet have used the term "balanced ration" to indicate that certain proportions of protein, fat and carbohydrate should be eaten. It is ordinarily said that 100 grams (6 to 7 ounces) of protein are necessary for a man every twenty-four hours, but many patients apparently do well on less, even on 80 grams. Protein is necessary, because new cells cannot be formed without it, though from fat and carbohydrate body fat can be formed. Fats and carbohydrates can be within broad limits freely replaced one by another. To outline a well-balanced diet with free use of milk and eggs is an easy task but to do so without milk and eggs is very difficult. Many patients have lived so long on large quantities of milk and eggs that even the sight of them may bring about not only loss of appetite but nausea too. For these reasons it is well, if possible, to have a dietary that precludes milk and eggs or depends upon them for only a small and concealed portion of the diet. It is no easy task and it is to be hoped that this attempt may help others over some of the rough roads that the author has tried to follow.

When repugnance to food is marked the diet must be not only liquid but as concentrated as possible. Hence the addition to the diet of sugar of milk (which is not very sweet) is very important and greatly increases the food values. Sugar of milk and ordinary sugar (cane) contain 120 calories in one ounce, while many of the prepared carbohydrate foods, such as malted milk, Mellin's Food, Fairchild's, Imperial Granum, Benger's, Eskay's, Carnick's, Nestlé's, Allenbury's Foods, Maltico, etc., which can be taken in fluids, vary from 100 to 120 or more calories per ounce. These substances will afford ample liquid carbohydrate food.

The fats are less easily supplied and often far less easily taken. Cocoa for many patients is the most palatable form in which to eat fats, for a large cup (8 ounces) contains 144 calories in the form of fats and totals in all about 280 calories. If sugar of milk be added to cocoa, it is readily seen that it forms a most valuable and concentrated food. Phillips' cocoa can be taken by some patients who can digest no other. Other forms in which the supply of fats may be taken are cod-liver oil, either pure or as an emulsion (Scott's), olive oil, cotton-seed oil, the prepared foods, Sevetol and Russell's Emulsion of Mixed Fats, etc. Olive oil and pure cod-liver oil contain about 120 calories to the tablespoonful.

To increase the supply of protein in the diet, the prepared foods, tropon and plasmon, may be

used in liquid form. It must not be overlooked that many of the other prepared foods contain a certain quantity of protein. Again, while it cannot replace the protein, gelatin, which can be prepared in liquid form, flavored with meat or fruit juices, and containing sugar of milk, spares the body protein and is most valuable. Many patients who cannot chew can swallow rare steak scraped and made into small balls the size of a marble which can, if desired, be rolled in powdered chocolate. Beef juice squeezed in a press from meat "grayed" in a dry skillet contains about 0.75 gram of protein in one tablespoonful.

Soups form a most valuable addition to the liquid diet. The clear soups, naturally, are less nourishing than the thicker soups. Bouillon and consommé contain very little nourishment and the bouillon cubes, as purchased, are said to be composed chiefly of common table salt. The thicker soups are much more valuable and when creamed (asparagus, celery, corn, , pea, potato, tomato) contain, in 8 ounces, from 235 to 300 calories, as well as a fair proportion of protein.

A chocolate milk shake, containing 4 ounces (8 tablespoonfuls) of milk, 2 ounces of cream, 2 teaspoonfuls of powdered chocolate, 1½ teaspoonfuls of sugar and 1 egg, contains over 400 calories and had best be given only once or possibly twice in twenty-four hours.

A substitute for milk may be made as follows: Four ounces of rolled oats are thoroughly boiled,

a little diastase is added, and the vessel placed in a warm place for several hours. About 5 to 10 per cent of the starch is converted into maltose. After straining add water to bring the volume to a pint or a pint and a half. Ground rice, wheaten meal, corn meal or a mixture of these may be treated similarly. The fluid contains less nourishment than milk, but is a valuable addition to a milk-free diet.

The following liquid menus are merely suggestions, which the patient's physician must modify or approve.

BREAKFAST (730 CALORIES)

Café au lait or coffee or, better, cocoa (8 ounces)
(with or without sugar of milk)
Two glasses of whole milk (1 pint)
(with or without Mellin's Food, etc.)
Two eggs (in the milk or separate)

DINNER (770–880 CALORIES)

Thick soup (8 ounces)
Beef juice (2 ounces)
Ice cream (2 large tablespoonfuls) or chocolate milk shake
Gelatin (4 ounces) (with meat juice)
Two eggs

SUPPER (840 CALORIES)

Junket (4 ounces)
Two eggs
Two glasses of milk, buttermilk
Thin gruel (to be drunk) (4 ounces)
Tablespoonful of olive oil (or other fatty food)

LUNCH AT BEDTIME (225 CALORIES)

Glass of milk with one egg.

When milk and eggs cannot be freely taken, the following may be tried:

BREAKFAST (500 CALORIES)

Thin gruel (to be drunk) (6 ounces)
(arrowroot, barley, oatmeal, etc.)
Coffee (with sugar and cream) or café-au-lait
(with milk-sugar)
Olive oil or Sevetol (½ ounce)

DINNER (750 CALORIES)

Thick soup (8 ounces)
Gelatin (thin, to be drunk) (4 ounces)
(with beef juice)
Scraped beef
Apple sauce (6 ounces)
(with sugar of milk or Mellin's Food)

SUPPER (750 CALORIES)

Thin gruel (another flavor) (6 ounces)
Thin jellied chicken soup
Russell's Emulsion (½ ounce)
Tea (8 ounces) with sugar of milk.

It must be borne in mind that such a diet may be very deficient in vitamins. Here some of the much advertised preparations which contain vitamins may be useful. This diet should be followed for as short a time as possible.

(See page 184 for Food Values.)

The pernicious habit of eating candy at all hours, without regard to the meals, needs only to be mentioned to be condemned. A little candy after meals or even at bedtime is, however, well borne by many patients.

III

ON ALCOHOL AND TOBACCO

"Abstinence is as easy to me as temperance would be difficult."

ON ALCOHOL

THE value of alcohol in the treatment of tuberculosis is very slight, if any, and the danger from its use is very great. Its use in the treatment of pulmonary tuberculosis dates back many years. In 1680 Richard Morton advised such a patient to "forbear wine and other spirituous liquors, but especially a debauch and a surfeit proceeding from overcharging the stomach with them." Nearly one hundred years later, Reid absolutely forbade them, and this at a time when drinking was very common. Brehmer, the founder of the sanatorium idea, advised the systematic use of alcohol, and his pupil, Dettweiler, also used it in limited quantities. Curiously enough, alcohol is used in the treatment of pulmonary tuberculosis in the private sanatoria in Europe today more freely than in any other part of the world. Since the death of the late Dr. Austin Flint, of New York, who advised for a time the free use of whisky in pulmonary tuberculosis, no great student of tuberculosis in America has advocated its use.

Alcohol has been said to warm a man in cold weather, but alcohol causes a dilatation of the bloodvessels of the skin which, as we know, is an important means of cooling off the body; and so in healthy men the skin is chilled. Those, however, who are subjected to great cold recognize the danger of this fact, and Arctic explorers absolutely prohibit its use. On the other hand, those who live in the tropics indulge in its use.

Its action upon the body has been carefully studied. Small doses (1½ ounces of pure alcohol) may be burnt up in the body and so possibly replace some of the fats and carbohydrates, but larger doses are not so disposed of, and act in the body as poisons. In small quantities it does not seem to increase the rapidity of the heart-beat nor its force, while it may accelerate digestion in the stomach, though its action is not always uniform. These facts relate to pure alcohol and not to much of the cheap whisky that is sold, which contains poisons even more deadly than too much pure alcohol.

The action of alcohol upon the tuberculous patient has been referred to, and its advocates base many of their arguments for its use upon the fact that it produces scar tissues in the liver, kidneys and bloodvessels. However, no conclusive proof has been adduced to show that the scar tissue in tuberculosis is not due to the tuberculous poison rather than to the alcohol. The study of alcohol as a causative factor in tuber-

culosis has been carefully investigated and many believe that it predisposes to the disease. However this may be, alcoholism and poverty are closely associated and the latter is also of prime importance. Whether or not tuberculosis runs an acute course in an alcoholic depends largely upon how much the alcohol has already affected him. Alcohol, even when not linked with poverty, fosters late hours, careless and irregular habits, for alcohol lessens the activities of the brain by affecting the most recently acquired faculties of self-control, repression and the sense of responsibility.

Alcohol as a food is eight times dearer than our ordinary foods and withal is of such slight value that we can disregard it in the treatment of pulmonary tuberculosis. "Drinking strong wine," says the Father of Medicine, "'cures' hunger." It has been said that when no wine is served at a banquet 50 per cent more food must be provided. Hence, alcohol is not only itself a poor food but may prevent the proper consumption of food. It remains then to consider it as a stimulant and as a drug. Is it a useful stimulant? Some of the great railway corporations have stated that they will employ no man who uses alcohol. Some prominent students of foods believe that the great majority of the human race at any age or of either sex will enjoy better health and will live longer without any alcoholic drinks The experience of Ameri-

can sanatoriums, where almost without exception alcohol is prohibited under penalty of expulsion, bears ample evidence that it is not necessary as a stimulant and rarely as a drug. In fact, many claim that alcohol is not a stimulant. It has been often stated that no drug should be taken without a doctor's orders and this is especially true in pulmonary tuberculosis. Great danger lies in the fact that a man with nothing to do but to take "the cure," is very likely to go to excess when once he begins to use alcohol. If it gains hold upon him his only course is to cut loose from his boon companions and change his residence.

ON TOBACCO

Little did Sir Walter Raleigh realize what he did when he introduced smoking to the white man. From that day to this praise and abuse have flowed and ebbed about the practice, and sad pictures of crime due to excessive use of cigarettes, or exultant chronicles of how their age of over one hundred years was attained in spite of tobacco, have been drawn. As a matter of fact tobacco injures fewer men than excess in eating. On the other hand, the nicotine, the active principle of tobacco, is very poisonous when taken pure. One-tenth of a grain of nicotine will kill a dog in a few minutes and a cigar contains enough of the poison to kill two men. The odor and flavor ("bouquet") and probably

the strength of tobacco depend in part upon the quantity and quality of this oil and in part also upon the products of decomposition of the nicotine. Nicotine acts chiefly upon the nerves and can be absorbed by smoking, snuffing or chewing the tobacco leaf. A large proportion of the nicotine in the tobacco passes over into the smoke, while the amount in the smoke depends upon the kind of tobacco, and the amount absorbed upon the way it is inhaled. Curiously enough, the cause of the pleasure of smoking has not been determined and seems not to have been proved to be due to the nicotine. It may possibly be due to the action of the smoke on the mouth, nose and throat. That it soothes and quiets some men cannot be denied, but that mental work and imaginative powers are increased or decreased is still an open question. For many it apparently has no harmful effect when used in moderation, but in excessive quantities it produces in some trivial, in others serious changes. The effect of the first smoke is usually marked by nausea and often by vomiting.

Tobacco rarely affects two smokers exactly alike. In some it produces a chronic irritation of the throat and a hacking cough which leads some patients to overlook the tuberculosis in their lungs. In others, through the free secretion of the saliva, which dissolves the nicotine, and its subsequent irritative action upon the stomach, it may produce loss of weight or indeed

prevent gain. Palpitation and irregularity of the heart, depression and muscular weakness are all produced by too much tobacco. Like any other fixed habit, it is very difficult to stop. The man who ceases to use it becomes restless and ill at ease. In a few cessation of smoking brings about gain in weight.

Knowledge of its action upon a diseased lung is of considerable importance. Unfortunately little is known, though there is some evidence to show that rabbits when treated with small doses of nicotine combat disease less vigorously. Smoky atmospheres are held to be injurious for patients with pulmonary tuberculosis, as they irritate the throat and pulmonary membranes. But throat complications are said to be as common in non-users as in users of tobacco, in women as in men. Tobacco smoke when inhaled may have a somewhat similar action, and recently it has been suggested that this irritation may aid in bringing about the formation of scar tissue, but this is still unproved. When a patient smokes fifty cigarettes a day it is easy to picture what the "atmosphere" in his lungs is. A pipe or cigar, when the smoke is not inhaled, is far better.

Moderate smoking, then, for a healthy adult, who tolerates well the nicotine, seems to exert little harm, but for growing boys evidence has been gathered to show that it tends to prevent the normal development. The inhalation of the

smoke is where the danger lies, and hence usually cigars or pipes are safer than cigarettes. As irritation of the throat is made worse in all conditions of acute or chronic throat disease, smoking should be absolutely avoided.

Observations made in the army show apparently that inhalation of cigarette smoke does not cause pulmonary tuberculosis. Some claim it has a retarding effect upon the germs always present in the mouth.

Many athletic trainers forbid smoking which some say decreases the lung capacity by 10 per cent. It may decrease mental efficiency in some. Finally it is far better for every patient to stop, for a time, all use of tobacco if he possibly can.

IV

ON FRESH AIR

"The best medicine! Two miles of oxygen three times a day. This is not only the best, but cheap and pleasant to take. It suits all ages and constitutions. It is patented by Infinite Wisdom; sealed with a signet divine. It cures cold feet, hot heads, pale faces, feeble lungs and bad tempers. It has often been known to reconcile enemies, settle matrimonial quarrels, and bring reluctant parties to the state of double-blessedness. This medicine never fails. Spurious compounds are found in large towns; but get into the country lanes, among green fields, or on the mountain top, and you have it in perfection as prepared in the great laboratory of Nature."

"FRESH air, good food, and regulated rest and exercise" is so familiar to most patients that they seldom pause to think what it all means. They have always heard "fresh air" put first. Indeed so deeply has this been stamped upon the mind of the average man that, if there is any one thing he connects with the treatment of pulmonary tuberculosis, it is fresh air. The value of food and exercise has been spoken of and it remains now for us to study the need and uses of fresh air during the "cure."

We have seen that food supplies energy and repairs the wastes of the body. Further, we have noted that in doing this the food is burnt

up or, as the chemists say, "oxidized," for all burning is a combination of the burnt matter with oxygen. Plunge a burning match into nitrogen gas and it goes out at once, for it needs oxygen to burn. The burning of food in our bodies is no exception to this universal rule. The air in which we live and breathe is a mixture of about 20 parts of oxygen and 80 parts of nitrogen. Most food substances when they are burnt combine with oxygen to form among other things a new compound, carbonic acid gas, which must be gotten out of the body. This is brought about by an exchange of gases, which takes place in the blood as it passes through the lungs. Carbonic acid gas is given off to the air and oxygen absorbed from it. For this reason we would suppose that the air which we breathe out would contain more carbonic acid gas and less oxygen. This is found to be true. Besides this gas the lungs give off several others as well as considerable water vapor. The respired air is also heated and in this way some body heat is lost. It can be readily seen that exercise causes more food to be burned than when the body is at rest, and, consequently, more oxygen must be absorbed and more carbonic acid gas gotten rid of. This produces more rapid and usually deeper breathing movements, whose danger has been discussed. High barometric pressure, such as occurs in caisson or submarine work, is dangerous for patients with pulmonary disease. Low

atmospheric pressure occurs in high altitudes (usually over 3500 feet elevation) and is marked at 14,000 feet (Pike's Peak). Mountain sickness rarely occurs at 5000 to 6000 feet, at which elevation most patients who go to high altitudes live.

The last half of the nineteenth century saw the institution of the fresh-air treatment of pulmonary tuberculosis, which in the first decades of this century has been extended to the treatment of many other diseases, including nervous and mental disorders, pneumonia and certain digestive disturbances. We know that fresh air is of great benefit in pulmonary tuberculosis, but even yet some of us have not fully realized that fresh air benefits patients with other forms of tuberculosis as much as it does those with the respiratory type. It is, then, safe to say that fresh air exerts no more influence on the lungs than on the rest of the body. A further fact bearing on this point is the unpleasant symptoms that many persons experience when confined in a close or stuffy atmosphere and forced to breathe "ruminated" air. It is almost needless to enumerate these symptoms—at first headache, drowsiness, lassitude, malaise, nausea, faintness, vertigo; later digestive and nervous disturbances, followed by malnutrition, secondary anemia and lessened resistance to infectious diseases. It is of considerable interest to recall the symptoms of mountain sickness experienced in very high

altitudes (15,000 feet): Headache, intense drowsiness, lassitude, nausea or even vomiting, fainting, vertigo and further palpitation of the heart, throbbing of the arteries and shortness of breath.

It would seem very reasonable, therefore, to infer that lack of oxygen in the latter case was the cause of the disturbance, and arguing by analogy, it would appear most probable that lack of oxygen was the disturbing factor in the former. Such certainly was long a current belief. The increased percentage of the carbonic acid gas has been held by some to be the chief cause, while others have believed that "crowd-poison" was the essential factor. The existence of "crowd-poison" has been questioned, and none has beyond all doubt proved its existence.

Are these, then, the deleterious substances that weaken resistance to and lessen chances of recovery from pulmonary tuberculosis when the patient fails to get fresh air? Ingenious experiments have been devised to help answer this question. Several healthy men have been confined in small cabinets and made to rebreathe a small amount of air. The percentage of oxygen quickly fell and that of carbonic acid gas rose greatly. The organic matter, which apparently bears some relation to the percentage of carbonic acid gas, must also have risen. The individuals all became very uncomfortable and finally ceased to talk. An electric fan inside the cabinet was then set in motion, and great relief was experi-

enced, even though the composition of the air remained unaltered. In another experiment, the individual within the cabinet was allowed to breathe fresh air, without, however, experiencing any relief. Still again, a person outside the cabinet was permitted to breathe only the air within the cabinet and suffered no ill effects. These and other careful observations have led to the conclusions that coolness, relative dryness and active motion of the air are factors to be sought after, and further, as James puts it, that "many atmospheres are good enough to be breathed which are not good enough to be lived in."

The temperature of the air plays an important role in health and disease. Recent inquiries concerning certain mill operatives in Connecticut have shown that men working on piece work accomplished more when there was a marked change in the atmospheric temperature, even from cooler to warmer conditions. As a rule, the more vigorous races live in climates where the cold, though pronounced, is not severe enough to limit the production of good crops. The custom of sending young and vigorous patients to climates with equable temperature has long since been abandoned. An average daily variation of at least 20° F. is one requisite of a good health resort for tuberculous patients. Sudden changes for vigorous patients act like a tonic and are to be desired when intelligently

met. This is a feature of the winter climate in Arizona, where a marked change occurs each night at sunset. The weight curve of healthy and tuberculous individuals bears this out. In 1200 patients at the Trudeau Sanatorium we found that the weight began to increase in August and continued to do so until Christmas. It then remained stationary or decreased slightly to Easter, after which it fell steadily to August. A marked change of temperature is usually noticed in the Adirondacks in August and early September, and the diurnal variations are great. I might add that this is probably the normal weight curve.

Nearly every tuberculous patient has a more or less deranged nervous system. Like cold tubs in typhoid, cold air in pulmonary tuberculosis is a great nervous sedative, for it abstracts heat, especially when in motion. Too intense or too prolonged cold, however, overstimulates some. It has long been a current popular belief in Saranac Lake that one hour of driving is worth two of sitting on the porch. Who can say that, besides the psychic influence, the rapid change of air about the body may not be greatly beneficial? Unquestionably the exhilaration of coasting and of automobiling may in part at least be explained in this way. In any case, to active motion of the air with the attendant evaporation of moisture from the surfaces of the body is to be ascribed much of the sensa-

tion of well-being experienced with good ventilation. It requires only slight movement of the air to increase markedly the loss of heat from the body. In cold climates this must be met by heat production, by muscular contractions, which, when the patient is at rest, are involuntary, but raise greatly the muscular tone.

The dryness of the atmosphere, that is, the degree of humidity, relative and absolute, plays an important part, but can be largely offset by motion of the atmosphere. Mere dryness is of little avail, for nearly every home in America, especially in winter, has an atmosphere containing far too little moisture —in fact, far less than is to be found in the deserts of Egypt or Arizona. The really important point is the amount of moisture that can be absorbed by the atmosphere from the surface of our bodies, and this depends on the humidity of the air, on its temperature, and most of all on its movement.

This brings us to the consideration of a few practical points in the fresh-air treatment of pulmonary tuberculosis. It might seem wholly insufficient, from what I have said, for a patient to be in bed with his head out of a window. In reality it may not be so, but, in my opinion, it is far less effective than the full air bath. Spraying the upper part of the trunk with cold water in typhoid fever is certainly not so efficient as a complete sponge, but does some good. So with the window tent. It must not be lost sight of,

however, that the room in which the body remains needs very careful ventilation.

A question that must be decided frequently is whether the roof or the back yard is the best place in which to take the fresh-air treatment. I do not hesitate to say that the roof should be used in every instance where possible, for several important reasons. The number of germs, the quantity of dust and the temperature of the air decrease directly with the elevation above the street, while the movement of the air increases. This leads to fewer secondary infections and to less irritation of the respiratory tract, and subjects the body to a far better hygienic environment. In summer, however, the roof may be too warm.

These newer ideas about fresh air throw grave doubts on the efficacy of "air carriers" and emphasize the necessity of life in the open "living" air. My impressions, after observing patients for many years, do not lead me to believe that sleeping out of doors materially hastens recovery, provided eight to ten hours a day are spent in the open air and the night passed in a well-ventilated room. In fact, for patients who are out of doors all day a change indoors at night may be beneficial. When, on the other hand, the patient returns to his indoor work, then sleeping out is very necessary. Ozone is said never to occur in rooms, however well ventilated, but it is of no value to man except as an

indicator of the purity of atmosphere, though this has recently been questioned.

A man out of doors is said to be exposed to 100 times more fresh air than he could get in the best ventilated room in any given period of time. In any room germs are partially protected, while in the open they quickly die.

What is the best dose of fresh air and how should it be given to the patient? (This implies that the patient has not had as much fresh air as he should.) This question needs a serious answer only during the colder months of the year. During the summer the house is kept open, fresh air is everywhere and the patient does well. When the chill of autumn comes, however, the house is shut up, except for a brief daily airing. The stimulation of the change of temperature and the bracing air usually buoy up the patient until Christmas. Then the confinement indoors begins to tell. He droops a little, and in early spring he fails somewhat or has a breakdown. This is unfortunately a common story. As soon as a patient knows he has tuberculosis he should begin to plan his life to live out of doors as much as possible. In the summer it is possible to spend twenty-three out of twenty-four hours out of doors, but in the colder weather it is irksome.

Dr. Brehmer, who founded the first sanatorium, had his patients walk out of doors to get the fresh air. Among them was a young physician, Dr. Dettweiler, who found he had not strength

enough to walk in the open air as much as he thought he should. He devised a long chair, a "cure" chair, a combination of bed and chair, which makes sitting out for patients without much strength a pleasure. The back was movable and with cushions it was far superior to the ordinary steamer chair. Dr. Dettweiler's chair was taken as a model when the author devised the Adirondack Recliner.

It remained for America to introduce verandas or porches upon which the patient's bed, provided with large casters, could be rolled when for any reason he should not leave it. Such provisions enable a patient to remain so long out of doors in suitable weather that it has been called the "twenty-three-hour treatment." A patient who has just begun the treatment seldom objects to life in the open air provided he is comfortably prepared for it.

In some instances it is impossible to move the patient from his room, and equally impossible to open the windows without subjecting his head to a strong draught. In such cases a frame covered with ordinary cheese-cloth should be placed in the open part of the windows. This permits free circulation of air without strong draughts. When sitting out a patient should be protected against strong winds by some form of wind-shield.

A tent as ordinarily constructed is very poorly ventilated, but when put up on a frame with

sides that can be pulled or rolled up it is transformed into an open veranda and is excellent.

It might be advisable to add a word about taking cold while living suitably protected in the open air. It is true that some patients are more susceptible than others to slight atmospheric changes. These patients must be trained or hardened to live in the open. This mode of living often brings about an entire readjustment, and the patient loses his susceptibility to colds.

Much has been written recently about the treatment of tuberculosis by heliotherapy (natural or artificial light baths). It is of interest to note that many have not found them to be of great or indeed of any value in uncomplicated pulmonary tuberculosis but in some forms other than pulmonary the effect is most striking. Wrongly applied such treatment may produce most unpleasant results and no one should begin it except on the advice and under the direction of a physician.

(Those who are interested in providing a suitable sitting-out shelter for themselves should consult "Sleeping and Sitting in the Open Air," by P. P. Jacobs, published 1917 by the National Tuberculosis Association, 370 Seventh Avenue, New York City.)

V

ON A PATIENT'S DAY

"The deficiencies of the present day will be supplied by the morrow."

It may seem unnecessary to many to enter into such specific details as are mentioned in this chapter, but odd things occur. Some years ago a patient was told he could walk ten minutes a day. He was very conscientious and strove to obey orders, but wishing to go to a certain place which required a walk of sixty minutes there and back, he saved up his exercise for a week and went! As the path to cure is steep and is paved with the stones of small details, it must be closely watched, as he who walks carelessly soon finds himself astray. The daily routine below is not to be blindly followed, but must serve as a basis for a talk with the patient's physician who alone is in a position to order most successfully his time. This program has been found to be the best for the great majority of patients:

7.30 Awake. Take temperature
Milk (hot if desired) if necessary
Warm water for washing. Cold sponge
8.00 Breakfast

8.30 Out of doors in chair or on bed
10.30 Lunch when ordered
11–1 Exercise or rest as ordered
1–2 Dinner. Indoors not over one hour, less if possible
2–4 Rest in reclining position. Reading, but no talking allowed
Take temperature
3.30 Lunch when ordered
4.00 Exercise in prescribed amount
6.00 Supper
7.00 Out on good nights
8.00 Take temperature
9.00 Lunch and bed
Once or twice a week a hot bath, followed by cold sponge

VI

ON SITTING OUT

"They also serve who only sit and wait."

LEADING an outdoor life in summer is a simple enough matter, more enjoyable than otherwise, but during the winter, especially in a cold climate and when one is not exercising, as is usually the case at first with those taking the open-air treatment for tuberculosis, some hardships may be expected. These hardships are magnified, however, by those who have never "taken the cure" and therefore know little or nothing about the matter.

If he be properly clad and sheltered from wind, rain and snow a person may be quite comfortable sitting outdoors even when the temperature is 20 to 30° below zero. It is the aim of this chapter to be helpful to those "sitting out" for the cure of tuberculosis. In offering suggestions the conditions which prevail in a cold climate are considered, but there are hints applicable to all climates.

While the patient must be outdoors in all kinds of weather for at least eight hours daily, it should be borne in mind that open air does not mean

exposure, and that to subject one's self to unnecessary hardships is not only foolish, but dangerous. A person should gradually accustom himself to the outdoor life, and should not stay out when chilled. "Chilled," however, does not mean that he merely prefers sitting indoors beside a fire. In being "unfaithful to the cure"—that is, in staying in when he should be out—he is retarding his recovery and inviting more serious illness.

One should be so "faithful to the cure" that his conscience will trouble him when he remains inside; in other words, he should develop an "outdoor conscience." Some may laugh at this, but it is when such a feeling asserts itself that the patient's chances of recovery are greatest.

If any encouragement be needed to brave the severe cold, it can be found in statistics, showing that patients improve more rapidly with the onset of winter than in summer. In fact it has come to be said that "one winter is worth two summers."

In the following pages will be found mentioned a great many articles that have proved of service to the "sitter-out." Of course, each patient will not require all of these articles, but what are absolute necessities at the start, besides warm clothing, are a comfortable chair, two good rugs or horse blankets, a small table and a sheltered spot on a porch or in a shack. The various articles of clothing suggested may be acquired as necessity arises.

VII

ON PREPARATIONS FOR SITTING OUT

"For every season she has dressings fit,
For Winter, Spring or Summer."

CLOTHES

Much depends upon suitable preparations for living out of doors. The high temperature at which many homes and office buildings are kept enables many persons to wear in winter clothes varying little in weight from those worn in summer. These individuals are usually robust and accustomed to active exercise. When they fall ill and must perforce spend many hours of enforced inactivity out of doors, they find such clothes very unsuitable. This is often more true of women than of men. Few hard-and-fast rules can be laid down, however, but it must be realized at once that chilling is very dangerous and may be followed by disagreeable and even dangerous complications. In other words, a safe plan is to dress in such a way that you will always be comfortable. The main requirement of all warm clothes should be that they are non-conductors of heat, or, in other words, they should prevent as much as possible the loss of the natural

body heat. Probably the best material for underwear is wool with a little cotton in it, as it is usually cheaper than pure wool, shrinks less from washing and gives sufficient warmth.

It is unwise to bundle up the neck and chest, and chest protectors and other swaddling clothes should be abandoned. A chamois vest that can be easily removed is permissible in some cases, but, as a rule, it is best to get along without it. The best sweaters are the "coat-sweaters" that can be easily removed indoors or laid aside should the temperature rise considerably during the day.

In regard to clothes, some knowledge of the temperature of the house or building in which the patient is to live is necessary. He must dress for this temperature, for it is easy to put on wraps when he goes out. Very heavy underwear in a warm house tends to produce a state of relaxed skin, constantly bathed in perspiration, and makes a patient much more subject to colds. He should dress to be comfortable indoors, wearing as little as possible, and add more overclothes for his outdoor life. In cold weather only the bathroom should have a temperature over 60° to 64°.

Irritation of the skin by woolens can be avoided by the use of cotton gauze garments under the wool. Some prefer linen mesh to wool, and by its use avoid colds, while others find it gives too little protection.

For sitting out when one does not use a bed

or cot a good chair, provided with a comfortable mattress, and two large (5 x 6 ft.) steamer rugs or blankets are absolutely necessary in cold weather. Horse blankets are cheaper than steamer rugs and two are warmer than one rug. Ordinary blankets, padded quilts, comfortables, paper blankets and other devices can all be used for this purpose. Woolen sleeping bags which unbutton down the front, fur rugs, which afford the best protection, a plush-lined rubber blanket, are all of value in different instances.

In cold weather a fur coat is necessary for sitting out. This may be obtained for any price from $20 up. Sheepskin, dogskin, raccoon, cowskin, and many other furs are suitable and make warm coats. The sleeves should be provided with wind-guards, the collar should cover the ears, the pockets should be wide and the coat long and roomy, so that a sweater may be worn under it if desired. This coat should not be worn while walking, but a mackinaw or short leather jacket lined with wool should be used. A sash tied snugly about the waist adds greatly to the warmth of the coat or jacket.

The feet and hands of many patients suffer from the cold. It must not be overlooked that chilly arms or legs produce cold hands and feet. These must be warmly clad. All shoes should be loose fitting. Two pairs of socks or stockings, high arctics, moccasins lined with sheepskin for drawing over the ordinary shoes, foot

muffs, all-felt shoes, pontiacs (long felt boots worn by lumbermen), equestrian tights for women, give comfort to different individuals. Leather or woolen leggings, spats and thick golf stockings are also useful. Any footwear that constricts the ankles tends to produce cold feet. Some must use artificial heat, and for them "soapstones," hot-water bottles, electric heaters or pads, stoneware "pigs," are useful, but a few believe they increase the tendency to chilblains.

Cold hands are often a problem. Gloves of many sorts can be had. They should always fit loosely. Fur-lined gloves (lambskin, not squirrel) are excellent. Dogskin or kid gloves under woolen are often successful. The author has tried while driving every form of glove and has been led to the conclusion that a pair of loose woolen mittens in a pair of leather mittens, lined with lambs' wool, is the warmest combination possible. For writing, reading or playing games, an excellent combination is to wear first, thin, easily fitting cotton gloves which allow perfectly free movement of the fingers and over them a pair of warm woolen mitts, fingerless and thumbless gloves (not mittens), which leave the fingers free. A long woolen wristlet is used with advantage by many.

There are many other accessories, such as caps of various designs, of wool or fur, which should be large enough to cover the ears when desired. The fur coat collar should cover the ears as well.

The many designs of caps render it impossible to describe them. For some patients a visor on the cap is most important as it protects the eyes from the glare of the sun. An ordinary eye-shade helps some who read facing the sky, but many will do better on bright days to sit with the back to the light.

VIII

ON THE PORCH

"The porch is the haven of rest for the patient, where anchored in the ebb and flow of invigorating air, he escapes the jetsam and flotsam of the air of the house."

PERSONS living in a health resort are often struck with the inconsistencies of the new arrivals. Every attention is paid to the selection of a room. It must be comfortable, well heated, and furnished with several easy chairs. For patients, however, who have to sit out, the porch is the most important part of the house, and too often the porch-space and its provisions for comfort receive scant, if any, attention. The foolishness of neglecting to select a comfortable porch where one is to spend eight to ten hours every day needs only to be mentioned to be recognized. The patient will use his room to dress and probably to sleep in, but the greatest part of his waking hours will be spent on the porch out of doors, and it is here that he needs the most comfort.

There is a growing tendency today to enclose the porch almost entirely with glass sashes which make ventilation very difficult. As a matter of

fact, some porches are colder and less well ventilated than many rooms with cross-corner ventilation. Coldness is no index of good ventilation. Porches with deep recesses are a great mistake. A simple rule in ventilation is to compare the air currents with those in water. A long inlet from a river has little circulation of water, and the same is true either in rooms or on porches. When two sides of a porch are well protected it is wisest to leave the others open unless the prevailing winds come from those sides. Where many patients occupy one porch the problem is more difficult, but can be solved. A chair placed deep in a recess should always be avoided. If both ends are open the draughts in such an outside corridor are very unpleasant, for wind has a greater cooling effect on the body than a still atmosphere many degrees lower. The depth of the porch should never be more than one and one-half times its front opening. Fixed or movable canvas or wooden screens can be used, but glass is to be preferred, as it admits light and sunshine. The porch should be so arranged as to get sunshine throughout the greater part of the short winter days, but this, while pleasant, is not absolutely necessary. The chairs should always be placed at least four feet apart, and patients with weak eyes often do well to wear eye-shades or turn their backs upon the light. An attractive view is of considerable value, but many patients are willing to

exchange it for one which presents the activities of life as shown by the passing crowd.

It was once firmly believed that the ground water and moisture played an important part in the occurrence of pulmonary tuberculosis, and it was predicted that when the great cities were drained the number of deaths would greatly decrease. While this has not taken place, porches on the second story, apart from the more extended view, have much to recommend them, insuring as they do greater removal from any soil moisture, less dust, more privacy. The porch should face south by southwest in winter and north in summer, but a southern porch shaded well in summer by deciduous trees is usually very habitable.

The porch is where the patient is to spend the greater part of his time during the first few months of treatment, and it should be made as comfortable as possible. A table, a small book case, a book rack to hold open his book while he reads in cold weather, and in fact anything that would tempt him to be out of doors is of importance. For the dark afternoons in late autumn and early winter a good reading light is essential.

Porches should be provided for those who are not able to be out of bed, and even many patients who spend most of their time up and about find such a "sleeping" porch very desirable if they suffer a temporary relapse. Such a porch should fulfil all the requirements noted for a sitting-out

porch, and should be connected with the sleeping room by a door wide enough to enable the bed to be rolled in and out. Proper shelter from the rain and snow as well as from wind is very important. An ideal sleeping porch is one sufficiently wide for turning the bed, built out from the second story, with two sides that can be fully opened. (See page 63 for porches of cheap construction.) The sides should be provided with dark curtains, but, better still, a "Black Knight," a small stockinette covering for the eyes, can be worn.

SITTING OUT CHAIR

The chair in which the patient sits out should be the most comfortable in the house. No expense should be spared upon it, for here the patient must sit many hours a day. A good chair should elevate the feet from the floor, have a movable back, move easily on casters from place to place, be strongly constructed and be provided with a good cushion, useful alike for comfort and warmth. Many types of chair can be bought. Personal experience has convinced me that none I have tried is more suitable than the latest models of the "Adirondack Recliner." A chair of canvas and wood can be had for much less but is not so satisfactory, as it often cramps the shoulders and lungs. It is of interest to note that as time passes more and more patients prefer to use their beds as a lounge or couch and use their chairs less and less.

HOW TO WRAP UP

How to wrap up in a chair may seem an unnecessary detail into which to go, but comfort cannot be divorced from contentment. Many ways have been devised and each patient has his favorite. The following is a way which has proved on extended trial to be of value, and it is offered for what it is worth. Place the rug, which should be large in size, fully extended on the chair. After sitting down grasp the part of the rug lying on the right of the chair and with a quick motion throw it over the feet and knees and tuck it well under the legs. Then do the same with the part of the rug on the other side of the chair but leave the edge free. Now grasp the free edge of the rug lying on the left hand side and pull it up hand over hand until the end which was lying free beyond the feet is reached. Then pull up the far end of the rug, taking care to uncover as little as possible of the legs, and tuck both sides under the knees. This will give three or four layers of rug over most of the legs, but only one over the feet. It forms, however, a bag out of the rug, and no air can enter. A second rug folded and thrown over the first makes a covering that defies the coldest weather.

IX

ON SLEEPING OUT

"Now blessings alight on him that first invented this same sleep. It covers a man all over, thoughts and all, like a cloak; it is meat for the hungry, drink for the thirsty, heat for the cold and cold for the hot. It is the current coin that purchases all the pleasures of the world cheap, and the balance that sets the king and the shepherd, the fool and the wise man, even."

SLEEPING out as an aid in the treatment of pulmonary tuberculosis may have been first put into practice in the Rocky Mountains, but its spread over America is due largely to the pioneer work of Millet. The exhilarating effect of life in the open has long been dwelt upon by sportsmen, and these two factors have influenced many persons in apparently perfect health to take it up. In fact today a considerable percentage of suburban houses are provided with sleeping-out porches. As a means of raising the resistance of an individual to tuberculosis it is very valuable. Many and varied devices for pursuing this have been put upon the market and have been referred to previously (page 63). Beds which can be pushed partly out of the window and window tents are far less valuable than a good porch. The advantages of sleeping out have been empha-

sized, if not overemphasized. For the invalid it has been pointed out that he is out of doors twenty to twenty-four hours a day, where usually the ventilation is perfect. On the other hand, as many conditions arise which render sleeping out inadvisable, a physician should be consulted about it by every patient. Some patients cannot sleep out of doors, and sleep must be had. The early morning light, the noises, the wind, the rise of temperature on some nights, all disturb sleep. Still in most cases such disturbances can be prevented. A few suffer from catarrh and have difficulty in breathing through the nose. For these sleeping out should be postponed. Some patients have occasionally to arise at night; for these the danger of exposure and chilling is considerable. There is also an objection which may be theoretical. Cool, fresh air acts like a tonic upon relaxed muscles and quiets often an overwrought nervous system. The loss of heat in the cold, fresh air is much greater than in a room. The loss of heat must be provided for, and to produce more heat the muscles remain in a state of prolonged slight contraction known as "tone." That it might be too prolonged in a weak patient is easily conceivable, and the ten to twelve hours indoors at night in a cool, fresh room certainly works no harm. In my experience I have seen many patients sleep out and many sleep in. I have tried to observe if any difference in the rapidity of healing occurred, but have not been

able to do so, provided, of course, that the patients sleeping indoors spent eight to ten hours a day in the open and slept in well-ventilated rooms.

The great advantage of sleeping out is obtained not by the patient who has all day to be out of doors, but by him who through lack of funds or through other unfortunate circumstances must be indoors nearly the whole day and often in a crowded store or office. He gets no fresh air and has no time to get it except at night. Here sleeping out or in may decide whether or not he remains well. For such a patient sleeping out if at all possible should be pursued. For another man who works, say, indoors and out, and at night must sleep either indoors in a poorly ventilated or overcrowded room or outdoors, the question can be easily decided. The establishment of "sleeping-out" sanatoriums or "night" sanatoriums has been begun and should be pushed. Patients who cannot afford to sleep out after working indoors would here have an opportunity.

NIGHT AIR

Night air has long been avoided as dangerous. Why it should be so considered is not difficult to discover. On the Roman Campagna it means or meant malarial fever to spend a night or many hours in the open. Today it is recognized that this has nothing to do with the quality of the

night air, but to the fact that at dusk the malaria-bearing mosquitoes leave their hiding or resting places and begin to bite. As a matter of fact the night air is often purer than the day air. As traffic lessens the production of dust is less, and the factories and foundries frequently bank their fires at night, and hence the night air contains usually far less dust and less smoke and gas. So, fortunately for us, when we must choose between pure night air outdoors or impure night air indoors, the choice is easy.

DRESSING FOR SLEEPING OUT

In making these or other suggestions for sleeping or sitting out, a climate where the mercury drops often in winter to zero is considered. For those who reside in a less rigorous climate this fact must be taken into consideration. Individuals vary greatly in their sensitiveness to cold and again some are warm during the day and cold at night, or conversely, which makes it clear that no hard-and-fast rules in regard to clothing, etc., for night (or even day) can be made. Each person sleeping out must be guided more or less by his own comfort, facilities and resources. While I have seen patients who in zero weather could sleep out in a thin cotton nightgown between cotton sheets and be comfortable, the majority cannot keep warm in bed in cold weather unless warmly dressed. In fact,

many have to dress especially for such a life, though each person is a law unto himself. Some must wear woolen underwear, woolen socks, stockings or bed slippers, outing flannel or flannel pyjamas, the legs of which are tucked into the socks, a woolen sweater, and a sleeping hood or helmet with a long neckpiece or cape which falls down over the shoulders and fits under the collar of the sweater. To protect the nose, some like a domino mask lined with flannel. Eiderdown leggings or boots which reach to the hips are convenient to wear between the room and the bed, or even on very cold nights in bed. Some patients prefer a woolen bathrobe to some of the garments mentioned. A knitted combination suit with feet, gloves and hood attached (llama wool garments), or Faultless Pyjamas, with hood, boots and coat of two thicknesses, can be purchased, and for very cold weather may be desirable. These are only a few of a thousand and one devices for being comfortable in bed out of doors. A "Black Knight" to keep the early morning light from awaking the patient is often useful and has been mentioned. An application of cold cream to the face some find helpful.

THE BED

When a patient is up and about, the bed is of far less importance than when he must spend twenty-four hours a day in it. For invalids con-

fined to bed the best is none too good. The hospital bed is of great advantage as it adds much to the ease with which the patient can be cared for. Good springs which do not sag in the middle are very important and box-springs when possible should be used. The mattress should be of hair and very heavy. To be comfortable while lying in bed out of doors, it is necessary to remember that cold can come through the mattress. To prevent this, stiff building paper which will not rustle can be placed between the mattress and the springs, or between two mattresses, if two are used. One or more blankets can be placed under the patient, who, if cold-blooded, should sleep between flannel or outing flannel sheets. The number of blankets sufficient to keep some patients warm weigh so much that they should be replaced by comfortables of eiderdown or lamb's wool. "Feather beds" as coverings are used extensively in some Swiss health resorts. Four double blankets (eight folds) are usually sufficient to keep the patient warm when sleeping out in zero weather. Over all can be thrown a large horse blanket, to protect the bed from rain or snow. The head of the bed should have over it a blanket or shawl to ward off the wind. Do not forget that too heavy coverings prevent sleep and produce a tired feeling the next morning. If possible the sleeper-out should go to bed in a warm room and have someone roll him out. If this cannot be

arranged for, he should have a warm dressing room and put on the eiderdown bootlets, mentioned previously, when going out to bed. If the bed must remain out of doors all day, a heated brick, soapstone, hot "pig," hot-water bottle, or electric pad should be used to warm the bed before retiring.

KLONDIKE BED

The warmest bed is that known as the "Klondike" bed. Place on top of the mattress a horse blanket large enough to hang well over the sides and foot. On this lay the ordinary blankets, and finally upon these a single sheet. Then fold back the portion of the bedding hanging over the foot of the bed until the fold is even with the mattress. The two sides are folded over until just enough space is left for the body to slip in from the open top. This insures a large overlap of the bedding. Large safety pins may be used to fasten the laps. Over the whole throw the counterpane and tuck it well under the mattress at the foot and sides. The pillows are placed in the form of an inverted V.

THE PILLOWS

When sleeping in an ordinary bed in a cold room or out of doors, much cold air finds its way under the covers through the space which unfor-

tunately is always ready to open up between one's head, the pillow and the mattress. To provide against this the pillows may be arranged in the form of an inverted V and the head placed in the apex. The shoulders should not rest upon any part of the pillows. This method is employed in the Klondike bed. Later a second method occurred to the author. One pillow is placed in the ordinary way at the head of the bed and two others, at right angles to the first, but under the covers. It is extraordinary what an amount of heat seems to be generated or retained in the pillow at one's back.

DANGER OF DAMPNESS

Few hesitate to affirm that a damp bed is dangerous, but not many have reasoned out why it should be so. Some indeed have stated that when a hot-water bottle has leaked in their beds they had no bad effects from ignoring it. What physical difference is there between a dry and a damp bed? Why is moist or damp air colder than dry air at the same temperature? The explanation is found in the fact that damp air or damp cloth dissipates much more readily the heat of the body. For a damp bed to do this it is necessary for it to be wet through and through. A damp sheet or a damp gown may have little effect when surrounded by many dry covers, for the dry covers prevent the loss of

heat. This fact is made use of in treatment, and the patient may be wrapped in a cold, wet sheet not only without harm but often with great benefit. From what has been said it can be readily seen that damp clothes or a damp bed that leads to loss of the body heat is very dangerous and should be carefully avoided. Some patients who sleep out prefer to keep their beds indoors and roll them out only when going to bed. The large number of patients living in climates far from dry, who are not able to do this and still suffer no harm, proves that such a step is rarely necessary.

X

ON THE PATIENT'S ROOM

"What room suffices him who knows a porch?"

For many reasons already mentioned the sick room is of secondary importance to the porch. In some instances, however, when a man suddenly becomes ill of pulmonary tuberculosis at his home and cannot be moved, and must occupy some room indoors, it is very important to have some knowledge of the requirements of a good room. In the first place the room should be well ventilated. This requires two openings to the outside air, for no air flows out of a room unless it can be replaced by air from without the room. It is much like the flow of water or oil from a barrel. A vent is necessary for the continuous flow of the fluid. A match or a candle held in front of a window quickly tells the direction of the flow of the air. All communications with the rest of the house should be closed in cold weather, for the heated air from the lower floors quickly rises through the halls to pass out of the open windows, and if only one opening exists, the invalid breathes the air from the house and not the live air outside. Every room, therefore,

should have two windows or a window and a door leading into the open air. These, if at all possible, should be placed so that cross-corner ventilation may be had. It is very undesirable to have only one opening, which is usually a window, to the outside. If this must be the case for a time, see that the window is always open at the top and bottom. It has been previously stated that air, like water, flows straight away whenever possible. A bed in a corner is therefore in the worst possible place in regard to the amount of fresh air that passes over it. It should really be in the middle of the room, or at least in the middle of a wall, to get the freshest air. Draughts across the foot of the bed are of no moment, and some patients even sleep with a strong movement of air upon the r faces without harm. The danger of draughts in a room is that the stream of air is usually small and plays upon a localized part of the body, while adjoining parts are subjected to much warmer air and less evaporation. This is the difference between draughts indoors and movements of air outdoors. Draught screens for the windows have been mentioned.

What has been said here relates to the house in winter, for, when all windows and doors are open, excellent ventilation can be had through the rest of the house.

The room should, of course, be as large as possible and removed from the rest of the house

to isolate it, as far as possible, from the necessary household noises and the odor of cooking. Only when very ill should the patient share his room with a nurse. It should, of course, be bright and well lighted at night.

The color of the walls should be a warm neutral tint and of such a texture that they can be easily cleaned. There is no objection to a few pictures, and a few rugs on the floor. It must never be lost sight of that pulmonary tuberculosis is not an acute disease like typhoid fever or pneumonia, and what could be endured for a few weeks cannot be borne for many months. The room must be as cosy as is consistent with good hygiene. A fireplace adds much to the ventilation.

The room should, of course, be kept scrupulously clean, and only a damp cloth or dustless duster used for cleaning, or indeed a vacuum cleaner.

When the patient is not in the room it should always in cold weather be kept closed.

XI

ON EXERCISE

"Those who are accustomed to endure habitual labor, although they be weak or old, bear it better than strong and young persons who have not been so accustomed."

EXERCISE is as important as rest in the treatment of pulmonary tuberculosis but vastly more dangerous. We are all so accustomed to regulating our own exercise that it seems the height of folly to listen to anyone who allots to us only a few minutes a day for such a mild form of exercise as walking and then only upon the level. When exercise should be begun depends entirely upon the progress the walling-off process has made. When the dots of disease (called "tubercles") are so firmly and solidly walled off that exercise with its attendant increase of the circulation produces no evil effects, washes out no more poison than the body can take care of, then the time for leaving bed or beginning to walk has arrived. It is readily seen, however, that the onset of evil days may be so gradual, so stealthy, that even the trained observer may be puzzled to say whether or not they approach. If this be so, as it is, then it must be the height of folly for an untrained observer, whose mental

powers and judgment have been weakened by the disease-poisons, to attempt intelligently and cautiously to dole out his medicine, for in these cases exercise is medicine and dangerous medicine. It has been stated that few would care to dose themselves with arsenic or strychnine, when an unlimited quantity was placed before them, and they were told that $\frac{1}{50}$ grain would benefit them, while 1 grain would produce serious symptoms of poisoning. They would no doubt hesitate long and decide finally in all probability that they would take their chances without depending upon the tonic effects of either drug.

Now exercise for the average patient with pulmonary tuberculosis works far more harm, poisons vastly more people, than either strychnine or arsenic ever does. But, like food and air and rest, exercise is at the beck and call of everyone, and most of us foolishly imagine we can employ it in our own case cautiously, skilfully and helpfully. We argue thus from the fact that, since in health we have found that exercise benefits us, it should do so now. But we reckon without the tiny dots of disease and the poison they contain. There is no danger for the patient with pulmonary tuberculosis so great as that contained in exercise. His desire should be to obtain the most expert medical advice he can and then faithfully and trustingly to follow it. The advice of the family, given in ignorance, to do more than the physician says is fraught

with great danger. They only too often and too late recognize that the physician must have possessed some knowledge of which they were ignorant. So, too, with the advice of patients who have taken the "cure" for years, who long since have given up hope of arresting their disease, and live long in chronic invalidism. They advise early and recent cases to take more exercise than their doctors prescribe, calling attention to the fact that they in their much worse condition can do so, and thus often work irretrievable harm to the beginner if he listens to their dangerous wheedling.

As soon as a patient leaves his bed he begins to exercise. It has been found that simply getting out of bed and standing on one's feet raises the temperature, for many large and powerful muscles are called into play to keep the body erect. Even sitting in a chair requires more food to prevent loss of body substance than lying in bed. Walking increases the amount of food needed very considerably. If a man weighing 132 pounds walks two and one-half miles an hour, he requires 132 calories of food over and above what he needs while resting, or over 200 per cent increase. Sewing, crocheting or embroidering causes an expenditure of 9 calories more per hour than sitting in a chair, while washing, sweeping or scrubbing requires 50 more per hour; and ironing, dish washing and dressing a child 24 extra per hour, when the worker is fit,

and probably more when not. Such facts must be borne in mind constantly. The question of when to get up must be decided by the physician, but how to get up may be discussed in detail here. The effects of overexercise are not immediately apparent. The rise of temperature produced by the poisons flushed from the diseased areas into the circulation may not occur until the following day. Hence the rule, when beginning any form of exercise, try it at first on alternate days. Only on the day following the exercise can its effect be observed. Sitting up in bed, seeing visitors, reading, and particularly writing and games, are all forms of physical and mental exercise and must be carefully regulated. For some patients, writing and all games should be avoided for many weeks after physical exercise has been begun, for mental excitement is very injurious to some. The daily trip to the toilet is the first out-of-bed exercise permitted. It should be made every other day at first, but the physician's explicit permission must be obtained before this is begun. When this is well borne—all must depend upon the doctor's advice—sitting up in a reclining chair for one hour every other day may be begun. Dressing entails considerable exercise and should follow only when sitting up in the chair for two or more hours a day produces no ill effect. How quickly all this may be accomplished depends in part upon how long the patient has been in bed and

how much his general health has suffered. It is wiser to go slow than to have to begin afresh. Walking comes next, walking at two to two and one-half miles an hour on the level. He should cultivate the "t. b. tread." Remember that deep or rapid breathing may even now stretch the scar tissue, and allow the escape of germs or poisons. Never move so fast that you must pant, and remember that walking in snow is much more fatiguing than walking on dirt or on a pavement. Even before walking, driving for an hour in an easy carriage, or motoring at 20 to 25 miles per hour, may be advisable. Driving one's self may be indulged in later, but more than one relapse has come from attempting to hold a horse, frightened by a break in the harness or carriage, or by an automobile or other moving object. Changing a punctured tire, attempting to get a car out of a ditch or cranking when the self-starter fails to work, have been more than once the starting-point of a relapse. Cranking a motor boat seems especially dangerous for patients. Driving a car for an experienced driver entails some mental but not much physical effort as long as a speed of 25 miles per hour is not exceeded. It should not be undertaken until the patient has at least sixty minutes' exercise a day. Occupational, rather than vocational therapy, *i. e.*, for pleasure and to pass the time rather than with an idea of developing a new occupation when return to

work is permitted, is of great help to nearly every patient, but must be carefully prescribed and directed by the physician.

Let us take for granted that the earlier stages of exercise are successfully passed through and all is apparently going well. What are some of the danger signs of renewed activity of disease? The disease is treacherous and the germ slumbers not nor sleeps, but lies in wait for a false move to extend its field of operation. The first symptoms are so indefinite that it is often impossible to say that they are symptoms of the disease, and not due, for example, to a disordered stomach or intestine. A slight feeling of lassitude, slight loss of strength, a sense of fatigue from the accustomed exercise ("lack of ginger" some would call it), loss of keenness of appetite, a disinclination to get up after ten hours in bed, a slight headache, one or many of these may indicate that the "cloven hoof" will soon be seen.

Attention was called to the fact that a rapid pulse may be a sign of nervousness, or of a heart temporarily weakened through disease. The heart is a muscular bag and has as its task to pump out a certain quantity of blood in a given time. If the muscular wall is weak and the bag cannot fully empty itself, it can be readily seen that to force out the same amount of blood in the same time the bag must contract more rapidly. The pulse is the guide to the rapidity of the contractions of the heart. When the pulse

is fast, and nervousness not a factor, it is probable that the heart is a trifle weakened from the effect of the poison from the area of disease. This means that the dots of disease are not fully enough walled off, and hence exercise, when the pulse is fast, may prove to be dangerous.

The pulse varies with age and in some individuals. Napoleon's pulse was said to be 40 per minute. As a fair average the normal pulse may be said to fall between 70 and 80 beats in a minute. A person usually increases the rapidity of his pulse by attempting to count it. Excitable individuals often for longer or shorter periods have a more rapid pulse. When, however, the pulse runs from 90 to 100 or more after resting one hour or longer, it is inadvisable to exercise without the permission of a physician.

Exercise entails the burning up of more food than is used when the body is at rest. Loss of weight means that the loss of body substance exceeds the gain from body repair. The bank account is overdrawn and the business must pass into the hands of receivers, unless the profit quickly equals or exceeds the loss. The bank account of body substance cannot be overdrawn any length of time without danger of failure. The patient must retrench and cut down the excessive expenditure. Now if exercise (expenditure) produces continued loss of weight, it must be replaced by a period of retrenchment (increased rest). In other words, continued loss of weight

demands an increased amount of rest or possibly total rest.

Of course, when a patient weighs much more than his height, age and build indicate as normal (see page 123), he must expect to lose some weight when he begins active exercise or returns to work. As long as his muscles harden and his weight remains equal to or above his normal, exercise should be taken. Here, too, the advice of a wise physician is very necessary. Another point of interest is the seasonal fluctuation of the body weight. Late in the summer or early in the fall, as the nights cool off and the days grow less warm, the body in most people slowly gains weight. This gain continues until about Christmas, when the body weight begins to fluctuate with a slight loss, which continues until Easter, when the loss of weight is more pronounced until it again begins to rise in August or September. Of course, climatic conditions modify this.

It is, of course, needless to add that temporary complications, such as blood-spitting, rapidly occurring shortness of breath, night-sweats, severe pain in the chest, and many others, all demand cessation of all and every form of exercise until a physician is consulted. In fact, a wise patient when in doubt about the advisability of certain exercise at a certain time, will refuse to engage in it without special permission from his physician.

Much has been written in the past few years

about the "auto-inoculation" or work treatment. The word inoculation means, as here used, that the patient uses his muscles until his heart and muscles of breathing are quickened into such rapidity, or so forcibly used, that poisons, lurking in the dots of disease in the lungs, are washed out by the more rapid and forceful circulation of the blood. The dose of this poison, or the "auto-inoculation," may be so severe that fever and prostration ensue, or so light that its only manifestation is increased sputum. When properly employed this method has yielded wonderful results, but few physicians can watch the patients closely enough to use the method properly, and wrongly used, it may quickly result in disaster. Certainly no one can use it without much study.

Pulmonary gymnastics or repiratory exercises occur to the mind of every patient who falls ill of lung tuberculosis. They argue that patients are sent away from home for the "air." The air, therefore, must be the important factor. The air enters the body through the lungs, and the more deeply they breathe the more quickly will they recover. For this reason respiratory exercises are an important means toward recovery. It is curious, however, that the invigorating effect of air or change of air is not due to its effect upon the lungs, and through them to the rest of the body, but to the effect upon the body and through it to the lungs. Many arguments have been advanced for and against pulmonary gym-

nastics and inasmuch as the same object is attained by walking on the level and uphill, it is wisest probably to avoid such exercises unless especially ordered by the physician. Muscular exercise increases the rate (number per minute) and depth of the respiratory movements. Now through the lungs the carbonic acid gas, a waste product of muscular activity, is gotten rid of and oxygen absorbed. During muscular activity more carbonic acid gas must be set free and more oxygen absorbed than when at rest. But not enough oxygen is absorbed to oxidize all the waste products of the muscles when exercise is taken and these substances irritate or stimulate certain parts of the brain, and more frequent and deeper breaths are taken. This holds true no matter what set of muscles are exercised, provided only that they are of sufficient size. Walking, for example, on the level and up grades would suffice to exercise fully the respiratory muscles of a patient, who by this means of exercise takes three times as much air into his lungs as a patient who remains still.

It may be of assistance to some to have these rules boiled down, compressed into small space, for ready reference.

RULES FOR EXERCISE

(Exercise means walking. Special permission must be obtained before indulging in other forms of exercise.)

None if feverish.
None if blood in sputum.
None if loss of weight.
None if fast pulse.
Never get out of breath.
Never get tired.
Never run.
Never throw.
Never hang by the arms.
Never lift heavy weights.
No mountain climbing.
Go slow.

Exercise regularly and systematically whether rain or shine.

Walk uphill at start so as to come downhill on return.

Remember always that you will have to return.

Rest one-half hour before and after meals.

XII

ON CULTIVATING AN OUTDOOR HOBBY AND ON RECREATION

"Better to hunt the fields for health unbought, than fee the doctor for a nauseous draught."

THE mad rush of life in America means many different things to many people. To the Englishman, accustomed for years to a leisure class who devote themselves to sport, art or travel, the man of affairs in America seems to have but one goal, riches. To them "trade" as a profession is incomprehensible and playing such a game inconceivable. The association of America with gold has been so pronounced since the discovery of Columbus to the present day, that to the majority of Europeans we seem to be engaged in a life-long struggle for the root of all evil or else in watering the plant. In other words, we spend our lives in preparing to live and never find time to live. There is, however, a growing tendency for a man to retire from business at an earlier age, but unfortunately for many, such retirement is often associated with a relaxation of mental as well as of bodily effort, which leads in some cases to a rapid deterioration of all the

better qualities that made the man successful. He has developed no tastes, no pursuits apart from his business, which he must follow to escape boredom. This unfortunate state of affairs is true also when the business or professional man falls ill of tuberculosis. Apart from his calling he has few or no resources and, unable to follow his calling, he wanders about like a lost soul. The advantages of resources within himself have never before occurred to him and the therapeutic value of a hobby, an out-of-doors hobby, is an unknown thing.

It is a curious thing, but play brings relapse more often than work. The writer frequently tells patients that how they will do depends more upon what they do after working hours than upon their work. Put in another way it may be stated that they can play and get well, or work and get well, but they cannot play and work and get well. This means that recreation which entails exercise may add the proverbial straw. A patient who must return to work at the end of six months or a year must clearly realize that he must take much of his recreation while resting.

In discussing recreations it may be well to generalize a little at first. A tuberculosis patient should cultivate outdoor pleasures whenever possible and, as soon as his condition permits him to move about, a wide field is open to him. On the porch, however, many take up bird study

and with the aid of opera or field glasses it is remarkable how many birds a patient can come to know even while in bed. Botany, too, may be begun in a similar way, for many patients or friends willingly bring strange or common wild flowers to anyone whose field of action is strictly limited. It must be fully appreciated, however, that the bird life and plants of any locality are so great in number that at first the bewilderment of riches seems overwhelming. In a short time, however, the patient becomes orientated, and his pleasure and delight in the subject grow every day. Some, again prefer geology, and glacial deposits and erosions have for them great interest. Photography is now made so easy that little experience is needed to take a fairly good photograph, but much study and interest can be aroused by pursuing such a hobby further, and for these color and stereoscopic photography have perennial charms.

After the patient has taken sufficient exercise, driving, gentle horseback riding and automobiling may be indulged in, but—the amount must be prescribed by the physician. Croquet may be played, and later on under his physician's direction a little putting, followed later by a few holes of golf. The full swing in golf, however, cannot be recommended. Fishing from a boat entails little exercise when the patient does not row and prefers trolling. Later, rowing a light boat in calm weather or shooting, when it does not involve too much exercise, is permissible. Hunt-

ing, polo, mountain climbing, tennis, and baseball involve at times sudden and excessive strain, and a wise patient will turn elsewhere for amusement. After the disease has been arrested for several years a little swimming may be indulged in. Occupational, vocational, and recreational, or diversional and pre-vocational therapy have been of great aid in treating many of the veterans of the late war. It has long been recognized that an unoccupied mind often reverts to unwholesome worry. In many army hospitals such work was a wonderful aid. Years before, however, it had been in successful operation in several sanatoriums and had helped hundreds of patients whose time hung heavy on their hands. More recently this work has been modified so that some patients, still confined to bed, might nevertheless be helped. Basketry, beadwork, raffia, painting toys, tatting, lace-making, sealing wax beads, etc., are useful under certain circumstances. Language study has helped some and correspondence courses are helpful to many. It is a curious psychological fact that the more useful the work or occupation, the more beneficial it is.

Indoor games and amusements are never as good for anyone as outdoor. The excitement caused by playing games for stakes is harmful to some patients and for many months should be avoided except under medical direction. Indeed, some patients for many months cannot indulge in any competitive amusements without harmful

effects. The strain of playing upon the piano or other musical instruments is not well borne by a number of patients. Pool and billiards entail much exercise and at times stretching, and only when the tables are in a well-ventilated room and the patient has considerable exercise should they be played. Sewing, knitting or crocheting for pleasure or to pass the time are permitted, but those who feel that they must finish so much every day should avoid them. Solitaire may speed along many lagging hours.

Bathing increases the metabolism (*i. e.*, the amount of food burnt) five or six times, and swimming in cold water up to nine times the usual.

The respiratory exercise induced by singing, especially solo singing, should be postponed as long as possible. Gymnastic work, except the use of weights and pulleys, had better be omitted. Hanging by the arms has led to more than one fatal result. Boxing has, in the author's experience, at least twice led to hemorrhage of the lungs. After long arrest of the disease, bowling with light balls may be cautiously undertaken, but the ventilation is often bad and other forms of recreation are to be preferred.

The gymnastic exercises described by Walter Camp as the "Daily Dozen," are excellent for the healthy but great care should be taken about too rapid or too deep inspirations as well as about too vigorous execution of the movements by those who have much scar tissue in their lungs.

XIII

ON THE TEMPERATURE OF THE BODY

"Oh friend! have you not felt the wild desire
To call your mouth-thermometer a liar?
Would we could shatter it to bits—and, then,
Remould it so it never could go higher."

INASMUCH as it is expedient for all patients for a time at least to take their temperatures, they should know a few fundamental facts about the body temperature and about the thermometer.

The association of increased body temperature or heat and disease was noted in the fifth century before Christ by Hippocrates, the Father of Medicine. As time passed by, however, less attention was paid to it, and when Galen lived in the first century after Christ little thought was bestowed upon the body heat and the variations in the pulse were considered all important. No protest was uttered until Sanctorius, an Italian of Padua, in 1625, described a clinical thermometer, and published a study of the temperature in health and disease. Not until one hundred years later, however, was the clinical thermometer introduced by Boerhaave into clinical medicine, for he maintained that external

febrile heat could be recognized by the thermometer. He used the Fahrenheit scale which we still employ today. Only about 1750 was temperature taking in the hospital made practical by a pupil of Boerhaave, de Haen, who lived in Vienna. The question of what was the normal body temperature was still unsettled, and some held it to be 108° F. George Martino in 1738, published the only scientific treatment of this subject before Wunderlich, and using this data James Currie in 1797 laid much stress on the variations of temperature in disease and its treatment. It remained for a Frenchman, Becquerel, in 1835, to establish the normal body temperature at 98.6°. The study of the temperature in disease then proceeded along an orderly line, and in 1868 Wunderlich, stimulated by Traube, both Germans, published a study of the temperature in 25,000 persons, having taken some million observations of temperature. "He found fever a disease and left it a symptom."

The first thermometer was the hand of the observer, often placed in or near the armpit, but this was very crude and liable to many errors. The earliest attempt at an accurate measurement of temperature was probably that devised by Galileo in 1597. A glass tube was inserted in a closed glass vessel partly filled with colored water. As the air in the vessel expanded by heat or con-

tracted by cold, the fluid rose or fell in the glass tube, upon which was placed a scale. Bianconi used the word "thermoscope" in 1617 and Luerechon, "thermometer" first in 1624. The first thermometer with a scale was made by Ferdinand II, Grand Duke of Tuscany in 1641, but the scale was not fixed. In 1714, Fahrenheit, a mechanician of Danzig, made a thermometer, whose zero was at the lowest temperature obtainable at that time, namely, that of a mixture of salt and snow. According to his scale, water froze at 32° and boiled at 212°. A few years later Celsius, of Upsala, devised a new scale, where the freezing-point of water was 100° and the boiling-point zero. This method of dividing the scale between the freezing- and boiling-points of water into 100 degrees is now known as the centigrade or hundred-scale but the scale has been inverted, and zero is now the freezing point of water and 100° the boiling-point. It is used the world over in scientific work and everywhere in the study of the body temperature, except in the United States and England, where the Fahrenheit scale is employed. It should be noted, however, that the Réaumur scale (0° at the freezing- and 80° at the boiling-point) is used for household purposes in Germany.

A comparison of the two scales (centigrade and Fahrenheit) may be of interest and of value to those who may go abroad.

°Centigrade		°Fahrenheit.
35.0	=	95.0
35.55	=	96.0
36.0	=	96.8
36.11	=	97.0
36.66	=	98.0
37.0	=	98.6
37.22	=	99.0
37.77	=	100.0
38.0	=	100.4
38.33	=	101.0
38.61	=	101.5
38.88	=	102.0
39.0	=	102.2
39.44	=	103.0
39.5	=	103.1
40.0	=	104.0
40.5	=	104.9
40.55	=	105.0

The little clinical thermometers, which we now use so freely and break so easily, have come down to us through modifications at many hands. At first the thermometer had to be read while still in contact with the body, for the mercury quickly retracted and the reading was inaccurate. James Currie, an Englishman, whose work on the body temperature is a classic, introduced a tiny bit of iron which held the mercury at its highest point, but today a slight constriction in the diameter of the glass tube acts in the same way. The mercury rises above it when the bulb of the thermometer is warmed by the body but cannot fall below it until shaken down. The clinical

thermometer is therefore a maximum thermometer; it registers the highest temperature. The earliest clinical thermometers were cumbrous things, ten or twelve inches long and physicians were loath to use them. In 1870, Sir Clifford Allbutt of England had made a smaller instrument but its introduction was slow. In the Civil War (1865) the clinical thermometer was seldom employed. The many steps necessary for its construction emphasize the fact that accuracy and care in construction must be sacrificed when it is made to sell at retail for much less than one dollar. Only a special sort of hard glass is suitable for the bulb which holds the mercury. It must be heated to blow it and for months afterward it shrinks. Thermometers made from such "unripe" glass are consequently inaccurate and read often in a short time too high. It takes many months to ripen the glass. Many manufacturers agree to retest their thermometers after they have been in use a year. Few are returned! Now the very fine bore of the hair-like tube, through which the mercury rises, may not be absolutely uniform and hence the division of the scale may not correspond exactly to the temperature recorded upon the tube. Certificates indicating such corrections accompany many thermometers. The dislike of the patient to make such corrections may lead unscrupulous manufacturers to state that all their thermometers need no corrections.

As corrections of a tenth or fifth of a degree are of no practical importance it is better to buy thermometers from a firm that indicates occasionally a correction than from one which states that all their thermometers are absolutely accurate. In any case absolute accuracy of observation is unattainable, and generally speaking errors of two or three-tenths of a degree do not matter greatly. The scale of a good thermometer (92° to 110°) should be about two and one-quarter inches long, otherwise it is difficult to read. It should not be difficult to shake down, but many patent appliances now overcome this difficulty.

A good thermometer, when much distress of mind is occasioned by a rise of one or two-tenths of a degree, is of great importance to every patient. Price is not always a guarantee of excellence, but the cost of production of an accurate instrument far exceeds that of an unreliable one. A good thermometer must register accurately under all circumstances. If the scale is put on incorrectly the thermometer will, of course, be inaccurate, but if the bore of the tube is not uniform or if the mercury "jumps" or "retreats" it is unreliable, for the reading for these or other causes is not always the same at the same temperature. The clinical thermometer is a maximum thermometer, and registers only the highest temperature, for in the mercury column is a "trap" or constriction, so made

that while the mercury can be forced by this point when it expands, on contracting that part which passed the constriction cannot again fall below it. This can be made so tight that the mercury cannot be shaken down, and to make it just snug enough is not easy. The importance of "aging" the thermometer has been mentioned. It should be done after the thermometer is finished and before the scale is etched upon it. It has been pointed out that a certificate is of value only when it is known by whom it is given. The National Bureau of Standards in Washington will test or retest any thermometer and it is to be hoped that before long the government will supervise the manufacture of all clinical thermometers.

Before taking the temperature the lips should be kept closed ten to fifteen minutes and the thermometer inserted under and near the middle of the tongue for at least five minutes. It is not wise to leave it there longer. Hot or cold drink or food materially affects the mouth temperature for some minutes. Cold air also affects it slightly when the temperature is below 100°, but above that point hardly at all. Many advocate taking the temperature in the rectum, which for children and patients confined to bed is preferable. Standing on the feet, walking, horseback riding and nervousness in a patient raise more or less the rectal temperature. A healthy runner who won a long-distance race

had a rectal temperature of 105°, which did not fall to normal for twelve hours. Hence rectal temperature should be taken only after rest of one-half to one hour.

The normal mouth temperature may be said to be about 98.5°, though it may vary in different individuals from 97° to 99°. The rectal temperature varies from 0.5° to 1° higher. (All the temperatures referred to are measured on the Fahrenheit scale.) A subnormal temperature when the patient feels well need not be regarded. The important temperature is the highest temperature for the twenty-four hours. It is an interesting fact that the effect of exercise upon the temperature may not be noted until the following day. What probably happens is that the patient by exercise increases the number of the heart-beats and respirations, which help to pump out from the areas of disease poisons, which in turn affect that part of the brain regulating the heat of the body. When this is irritated, more heat is produced or less lost, or both, and hence the patient has a rise of temperature. It may require twenty-four hours for the effect to be noted (see page 93).

The temperature should be taken on awakening, at 12, at 4 and at 8 P.M. It may be wise to take it every two hours for several days at first to find out when it is highest, and then to take it at that time instead of at 4 or 8 P.M. Some patients become slaves to their thermometers,

"trouble sticks," as some term them. The thermometer must be used as an aid, not as a hindrance to recovery, and when such a state of affairs arises the thermometer should be put away and used only when the patient feels upset or ill. When the patient is not nervous he should record his temperature at the times mentioned and note the date and show it to his physician at regular intervals.

A little cold, constipation, an attack of diarrhea, tonsillitis and many other minor ailments may cause a rather sharp rise of temperature. When, however, without any special symptoms but increase of cough and expectoration the temperature rises slowly above 99.5° when previously it had been normal, the physician should be notified and the patient should remain quietly in his chair or if it reaches 100° he should go to bed.

Here it is important to remember that the temperature of yesterday decides what the patient must do today. If he has had elevated temperature for several days and it was 100° yesterday, he often feels that because this morning it is normal he can get up. The body temperature is usually lowest in the morning and gradually rises to a maximum in the afternoon or evening. Hence the error of using the morning temperature as a guide to increasing the exercise. A temperature of 100° yesterday usually means stay in bed today, but here again the physician must be consulted if grave mistakes

are to be avoided. From what has been said it is easy to see that a temperature above the usual morning temperature, although normal, may indicate that the temperature will rise above normal during the day. In this case it is wisest to remain in bed until noon, and only then, if the temperature is normal, should the patient get up. This holds true even if the increase of temperature is only from 97.5° to 98.5.°

It may be of interest to patients to know that temperatures ranging from 75.2° to 114.8° have been recorded in patients who have recovered. The temperatures of animals are usually higher than that for man: The horse, 99.5°; the cow, 101.5°; the sheep, 104.5°; the pig, 102°; the dog, 101°; the rabbit, 102.5°; the guinea-pig, 102°; the common fowl, 106.9°; the perch, 52°.

The temperature of the body is kept constant by the circulation of the blood. When the heat of the body rises too high more blood flows to the skin, the sweat glands are stimulated and the evaporation of the moisture (of the skin) cools the skin, the blood and hence the body. When the body is exposed to cold and the bloodvessels of the skin contract, the blood is driven into the internal parts of the body and the cooling of the body lessened. All of this, as has been stated, is under the control of a part of the brain. Exposure of the skin first to hot and then to cold water causes these little bloodvessels of the skin to dilate and contract, keeping them in

"condition," and so aids in preventing chilling when exposed to cold or dampness.

It must be borne clearly in mind that the temperature of patients with pulmonary tuberculosis varies from slight causes. Slight excitement, an interesting story, a game of cards, can all raise the temperature. Some patients have a normal temperature until they come into a warm room, when the temperature rises above normal.

Here the explanation lies in the fact that that part of the brain which controls the temperature is hypersensitive and cannot regulate the body temperature as readily as it does in health.

It has been mentioned that cold fresh air stimulates the body of a patient vigorous enough to bear it. All the processes of nutrition are whipped up by such treatment better than by any drug. More carbonic acid gas is given off, more oxygen absorbed, more food required, and all the processes of the body quickened. The old idea that life in a room with a temperature that does not vary two or three degrees a day is good for patients with pulmonary tuberculosis has long since been discarded. The equable temperature of the tropics is also bad for most patients. Today we know that a daily change of at least 20° a day is important for tuberculous patients. Greater changes even are good, and some have attributed the activity of Americans to the sudden climatic changes to which they are subjected.

XIV

ON CONTROLLING A COUGH WITHOUT DRUGS

"Be not discontented, be not disheartened, be not out of hope if often it succeed not."

THE best advice that can be given about a cough is that offered by Punch to those about to marry: "Don't!"

To the average patient who is suffering from pulmonary tuberculosis there are two points which are far above all others in importance. The first is the question of cough and the second is a question of whether or not he has developed a cavity in his lungs. Undoubtedly, to the lay mind, the cough is the main characteristic of pulmonary tuberculosis, and, for this reason, it is undoubtedly true that many patients will take any medicine, patent or otherwise, that is suggested to them by their friends or by advertisements. The object of this chapter is to suggest other means than drugs for the treatment of the cough.

The dangers of excessive coughing are many but chief among them is the fact that the lungs can get no rest. It has been estimated that a man who coughs hard all day takes as much exercise as another who climbs a mountain.

When the vast amount of literature that has been written on coughing is consulted, it is seen that the cause of a cough has been at one time or another attributed to an affection of nearly every part or organ of the body. The act of coughing is explained by the physiologists to be a preliminary inspiration followed by an expiration which is frequently interrupted, the glottis, or upper part of the windpipe, being partially closed at the time of occurrence of each interruption, so that a series of characteristic sounds is produced. The air is forcibly ejected through the mouth and thus foreign particles, such as mucus in the respiratory passages, may be expelled. Hawking, which is very similar to coughing in its effects, is a voluntary act entirely, while coughing may be involuntary or reflex in origin. In hawking the glottis is open during the respiratory act and the expiration is continuous. The current of air is forced through the contracted passages between the root of the tongue and the soft palate.

Coughing, in the vast majority of cases, is undoubtedly due to an abnormal condition of the lungs, windpipe or larynx (upper end of the windpipe where the voice is produced). However, it is said that it may indicate irritation in even remote and entirely unassociated parts—irritation in the nose, ear, pharynx, stomach, liver, spleen, intestines, etc. Such coughs are called "sympathetic" or "reflex" coughs.

Among the various causes of cough, other than that caused directly by tuberculosis, may be mentioned smoking, chilling of cold sheets at night, exposure to sudden differences of temperature, wind, dust, exertion—such as rapid walking, talking, laughing—pleurisy and many other things. Unquestionably, the first remedy to be tried for a cough should be the open-air cure. It is astonishing to observe how quickly many patients lose their cough when they "take the cure" faithfully. In others, however, the cough may be so severe that the mere fact that they lead an open-air life may not be sufficient to enable them to control their cough.

At this point it may be well to recall the fact that in some instances the cough is undoubtedly due in part to nervousness and can be largely controlled. An instance of this was observed several years ago, when a young girl, leaving home to go to a health resort, suffered severely from a cough which her physician thought was due in part to nervousness. On the trip she had a sudden scare and from that time on the cough disappeared. This cough was undoubtedly due to nervousness. It is for patients of this class that Dr. Dettweiler's advice has most weight. He said coughing was merely scratching the throat, and that it was as impolite to scratch the throat as to scratch the back in public.

There are many simple devices which one can follow for controlling the cough. Probably the best of all is rest in a semi-reclining position, or

indeed for several days in bed, avoiding talking and especially hearty laughing. Prolonged rest in bed may be required to cure a persistent and otherwise uncontrollable cough. Coughing during the day can frequently be controlled by sips of cold water, tablets of Iceland moss, slippery elm or glycerine; cold water with a little lemon juice or orange juice; very slow, full breaths, holding the breath, and many other such devices. Many of the widely advertised cough remedies, either in tablet or liquid form, may have a deleterious effect on the stomach and should not be taken without medical advice. This is true also of the glycerine tablets mentioned on the preceding page.

Patients with tuberculosis cough most frequently in the morning either before or just after rising. This cough is usually caused by some secretion which has to be gotten rid of. The cough which is productive, in other words, which is accompanied by expectoration, is to be separated in its treatment from a dry, hacking, unproductive cough. The mucus which accumulates in the lungs during the day and especially during the night has to be gotten rid of, as was stated at first, and the cough is the best means of freeing the air passages of the accumulated mucus. In a few patients the mucus can be expectorated without coughing. Such are indeed fortunate. When, however, a patient has great difficulty in rising in the morning and is troubled with severe coughing, a cup of hot milk, a cup of

coffee, or of *café au lait*, or a glass of hot water with a few drops of aromatic spirits of ammonia (10 to 15) or with lemon juice, very often gives relief. This should be taken, if possible, before the patient rises. Coughing is then made much easier. This, too, is an excellent means of preventing that dry, hacking, obstinate cough which is often followed by vomiting.

When a patient coughs after meals an excellent thing is to take a glass of very hot water, as was just suggested, half an hour before meals, endeavoring from that time to the beginning of the meal to cough as much as possible. If change of position does not bring on coughing it may be well for these patients to lie down immediately after meals for an hour or more. This, of course, should be done out of doors. A further point of considerable benefit to patients who cough until they vomit after meals is to take all of their fluids an hour before meals and none with the meal. This will frequently stop the vomiting. A tight cough at night is often helped by a cold pack on the chest and neck. However, before attempting this, one should get full details from his physician, how to apply it and whether or not it should be used in his case. It is usually applied as follows: Strips of cotton cloth of three or four thicknesses and four or five inches wide should be placed over each shoulder and a wide binder about the chest from the armpits to the lower part of the chest, after having moistened them with cold or warm water. This

should then be covered with oiled silk or muslin and a broad flannel bandage applied closely over the chest. In the morning on rising a cold sponge at least to the waist should be taken at once.

Some coughs are undoubtedly due to pleurisy, and in these cases counter-irritation by application of some liniment may prove of benefit.

It is needless to say that coughing is exceedingly disagreeable to everyone, including the cougher, and for this reason as well as others it should be controlled whenever possible. Furthermore, no one has any more right to cough without covering the mouth than he has to expectorate without taking care of the sputum.

Before taking any cough tablets or remedies other than the very simple ones mentioned above, anyone troubled with a cough should consult a physician. The doctor may be able to help him with some simple remedy that may prove superior to anything referred to in this chapter. In any event a patient should never take any remedy without notifying his physician.

Strange as it may seem few persons know how properly to blow the nose. The usual way is to close one nostril and to blow as hard as possible. This may blow sputum or secretions into the tube leading to the middle ear and bring about inflammation. Neither nostril should be completely closed, but the egress of air from one side partly blocked by holding the thumb or finger covered with the handkerchief over one nostril at a time and blowing carefully.

XV

ON THE BODY WEIGHT

"Success lies not in achieving what you aim at but in aiming at what you ought to achieve."

THE weight of the body varies with sex, age and height. Some divide all persons into three classes. The first is the normal type, which the painter and sculptor delight in portraying and the anatomist in describing. The other types are common; one is tall, thin, lithe, like the panther, quick of action but of very low weight for his height; the other, short, stocky, beefy like the ox, slow of action but steady of purpose and inclined to weigh more than his height and age would indicate. While any of these three types may fall ill of tuberculosis, it selects most often the thin type. The writer's experience leads him to believe that the usual weight of persons who develop tuberculosis is on an average ten pounds below the normal weight for their height, age and sex. It is readily seen that individuals belonging to this class should lead carefully regulated lives.

The loss of weight which occurs in some patients has given to the later stages of pulmonary tuberculosis the name phthisis (Greek) or consumption (Latin). The cause of this loss

of weight is most often failure to follow some of the suggestions set forth in previous chapters. The patients may, *e. g.*, continue to exercise notwithstanding high fever and lack of appetite. The engine runs at high speed and must have fuel.

The study of the weight in pulmonary tuberculosis is of much interest and importance. The weights should be accurately taken. They should be noted at the same time of day, in the same clothes, and on the same scales. What is more important is not the absolute but the relative weights from week to week. The charts prepared by Mr. G. J. Drolet for the New York Tuberculosis Association are based upon the records of 221,829 men and 136,564 women accepted by American and Canadian Life Insurance Companies. The charts are arranged for age, height and sex and are for individuals dressed in ordinary street costume with overcoats removed and measured in their shoes. Most persons weigh two or three pounds more at night than in the morning. "Normal" weight must not be confused with "usual" weight for in many patients the latter is ten pounds less than the former.

It has been stated (page 37) that it matters not how little a person eats provided he gains sufficient weight. "Sufficient weight" varies, of course, for different patients. For those greatly under their normal weight it must be more than for those who have lost less. In general it may be

STANDARD WEIGHT TABLE* FOR MEN

"IN ORDINARY STREET COSTUME, WITH OVERCOATS REMOVED"

Age.	5 ft.	5 ft. 1 in.	5 ft. 2 in.	5 ft. 3 in.	5 ft. 4 in.	5 ft. 5 in.	5 ft. 6 in.	5 ft. 7 in.	5 ft. 8 in.	5 ft. 9 in.	5 ft. 10 in.	5 ft. 11 in.	6 ft.	6 ft. 1 in.	6 ft. 2 in.	6 ft. 3 in.	6 ft. 4 in.	6 ft. 5 in.	Age.
15	107	109	112	115	118	122	126	130	134	138	142	147	152	157	162	167	172	177	15
16	109	111	114	117	120	124	128	132	136	140	144	149	154	159	164	169	174	179	16
17	111	113	116	119	122	126	130	134	138	142	146	151	156	161	166	171	176	181	17
18	113	115	118	121	124	128	132	136	140	144	148	153	158	163	168	173	178	183	18
19	115	117	120	123	126	130	134	138	142	146	150	155	160	165	170	175	180	185	19
20	117	119	122	125	128	132	136	140	144	148	152	156	161	166	171	176	181	186	20
21	118	120	123	126	130	134	138	141	145	149	153	157	162	167	172	177	182	187	21
22	119	121	124	127	131	135	139	142	146	150	154	158	163	168	173	178	183	188	22
23	120	122	125	128	132	136	140	143	147	151	155	159	164	169	175	180	185	190	23
24	121	123	126	129	133	137	141	144	148	152	156	160	165	171	177	182	187	192	24
25	122	124	126	129	133	137	141	145	149	153	157	162	167	173	179	184	189	194	25
26	123	125	127	130	134	138	142	146	150	154	158	163	168	174	180	186	191	196	26
27	124	126	128	131	134	138	142	146	150	154	158	163	169	175	181	187	192	197	27
28	125	127	129	132	135	139	143	147	151	155	159	164	170	176	182	188	193	198	28
29	126	128	130	133	136	140	144	148	152	156	160	165	171	177	183	189	194	199	29
30	126	128	130	133	136	140	144	148	152	156	161	166	172	178	184	190	196	201	30
31	127	129	131	134	137	141	145	149	153	157	162	167	173	179	185	191	197	202	31
32	127	129	131	134	137	141	145	149	154	158	163	168	174	180	186	192	198	203	32
33	127	129	131	134	137	141	145	149	154	159	164	169	175	181	187	193	199	204	33
34	128	130	132	135	138	142	146	150	155	160	165	170	176	182	188	194	200	206	34
35	128	130	132	135	138	142	146	150	155	160	165	170	176	182	189	195	201	207	35
36	129	131	133	136	139	143	147	151	156	161	166	171	177	183	190	196	202	208	36
37	129	131	133	136	140	144	148	152	157	162	167	172	178	184	191	197	203	209	37
38	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	198	204	210	38
39	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	199	205	211	39
40	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	206	212	40
41	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	207	213	41
42	132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208	214	42
43	132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208	214	43
44	133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215	44
45	133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215	45
46	134	136	138	141	144	148	152	156	161	166	171	177	183	189	196	203	210	216	46
47	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217	47
48	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217	48
49	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217	49
50	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217	50
51	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218	51
52	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218	52
53	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218	53
54	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212	219	54
55 and up	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212	219	55 and up

* Based upon the records of 221,819 men accepted by American and Canadian Life Insurance Companies. Report, Medico-actuarial Mortality Investigation, New York, 1912.

STANDARD WEIGHT TABLE* FOR WOMEN

"IN ORDINARY STREET COSTUME, WITH OVERCOATS REMOVED"

Age.	4 ft. 8 in.	4 ft. 9 in.	4 ft. 10 in.	4 ft. 11 in.	5 ft.	5 ft. 1 in.	5 ft. 2 in.	5 ft. 3 in.	5 ft. 4 in.	5 ft. 5 in.	5 ft. 6 in.	5 ft. 7 in.	5 ft. 8 in.	5 ft. 9 in.	5 ft. 10 in.	5 ft. 11 in.	6 ft.	Age.
15	101	103	105	106	107	109	112	115	118	122	126	130	134	138	142	147	152	15
16	102	104	106	108	109	111	114	117	120	124	128	132	136	139	143	148	153	16
17	103	105	107	109	111	113	116	119	122	125	129	133	137	140	144	149	154	17
18	104	106	108	110	112	114	117	120	123	126	130	134	138	141	145	150	155	18
19	105	107	109	111	113	115	118	121	124	127	131	135	139	142	146	151	155	19
20	106	108	110	112	114	116	119	122	125	128	132	136	140	143	147	151	156	20
21	107	109	111	113	115	117	120	123	126	129	133	137	141	144	148	152	156	21
22	107	109	111	113	115	117	120	123	126	129	133	137	141	145	149	153	157	22
23	108	110	112	114	116	118	121	124	127	130	134	138	142	146	150	153	157	23
24	109	111	113	115	117	119	121	124	127	130	134	138	142	146	150	154	158	24
25	109	111	113	115	117	119	121	124	128	131	135	139	143	147	151	154	158	25
26	110	112	114	116	118	120	122	125	128	131	135	139	143	147	151	155	159	26
27	110	112	114	116	118	120	122	125	129	132	136	140	144	148	152	155	159	27
28	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	156	160	28
29	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	156	160	29
30	112	114	116	118	120	122	124	127	131	134	138	142	146	150	154	157	161	30
31	113	115	117	119	121	123	125	128	132	135	139	143	147	151	154	157	161	31
32	113	115	117	119	121	123	125	128	132	136	140	144	148	152	155	158	162	32
33	114	116	118	120	122	124	126	129	133	137	141	145	149	153	156	159	162	33
34	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163	34
35	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163	35
36	116	118	120	122	124	126	128	131	135	139	143	147	151	155	158	161	164	36
37	116	118	120	122	124	126	129	132	136	140	144	148	152	156	159	162	165	37
38	117	119	121	123	125	127	130	133	137	141	145	149	153	157	160	163	166	38
39	118	120	122	124	126	128	131	134	138	142	146	150	154	158	161	164	167	39
40	119	121	123	125	127	129	132	135	138	142	146	150	154	158	161	164	167	40
41	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	165	168	41
42	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	166	169	42
43	121	123	125	127	129	131	134	137	140	144	148	152	156	160	163	167	170	43
44	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171	44
45	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171	45
46	123	125	127	129	131	133	136	139	142	146	150	154	158	162	165	169	172	46
47	123	125	127	129	131	133	136	139	142	146	151	155	159	163	166	170	173	47
48	124	126	128	130	132	134	137	140	143	147	152	156	160	164	167	171	174	48
49	124	126	128	130	132	134	137	140	143	147	152	156	161	165	168	172	175	49
50	125	127	129	131	133	135	138	141	144	148	152	156	161	165	169	173	176	50
51	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177	51
52	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177	52
53	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177	53
54	125	127	129	131	133	135	138	141	144	148	153	158	163	167	171	174	177	54
55	125	127	129	131	133	135	138	141	144	148	153	158	163	167	171	174	177	55

* Based upon the records of 136,504 women accepted by American and Canadian Life Insurance Companies. Report, Medico-actuarial Mortality Investigation, New York, 1912.

said that a patient should regain his usual weight and if possible should exceed it by ten to fifteen pounds. If this can be done only by overcrowding the stomach, great care should be exercised, and at the slightest sign of any digestive disturbance it should be abandoned. Some patients burn or oxidize very little of their food while others burn large quantities and remain thin. Patients with fever require more food than those with a normal temperature but often can digest it less readily. They should take the greatest part of their food when their temperature is lowest. Persistent loss of weight when the weight is not above normal must be combated by many means to be advised only by the patient's physician.

Some patients who have ceased to gain begin again when they commence to exercise. Weight gained while exercising is often more lasting than that gained at rest. The writer's impression is that weight gained on a good general diet including only a glass or two of milk and one or two eggs is more likely to be of permanent benefit than that put on from taking excessive quantities of milk and eggs.

Change of environment, even from one place to another in the same climate, is often of help. Change to more congenial companions, change of cooks, even changing one's place at the table may prove of benefit. Change of climate from the sea level to the mountains, or *vice versa*, is universally recognized as beneficial, and few choose to spend their vacations at home. Such

changes stimulate the nutrition of many patients. In fact, the gist of the matter is that we all need some of the spice of life.

Warmth and sunshine are not necessary factors for gain in weight; indeed, many patients do better in winter. Cold weather stimulates the patients much more than warm. Some patients, however, have an antipathy to cold, and these are frequently found to gain more in a warm, equable climate. Great dryness is not always conducive to gain in weight. Patients gain even when there is little sunshine.

A study of the records of the Trudeau Sanatorium will show that more patients gain and that the gain is larger from August to January. This is the period when the temperature begins to fall, but it also includes the greatest number of cloudy days. The precipitation departs slightly from the average during this period. Patients who have held their own or lost slightly during the early summer often begin to gain in August. This period of gaining extends to Christmas, when often the patient has surpassed his normal weight. During January, February and March the weight fluctuates and gradually begins to lessen. It is at this time that a radical change in the life of the patient, a change of environment and later of climate for a few months, proves of great benefit. From March to August there is usually a loss of weight. It might be added, however, that the weight of the body in health follows this course.

XVI

ON PATIENT AND PHYSICIAN

"A physician's advice is often of much more value than his prescription."

THE relation that should exist between physician and patient is peculiar and very difficult to define. Until recently every physician did and even at the present time many physicians still subscribe to the Hippocratic oath: "I will follow the system of regimen which according to my ability and judgment I consider for the benefit of my patients and abstain from whatever is deleterious and mischievous. I will give no deadly medicines to anyone nor suggest any such counsel . . . with purity and holiness I will pass my life and practice my art. . . . Into whatever houses I enter I will go into them for the benefit of the sick and will abstain from every voluntary act of mischief and corruption. . . . Whatever in connection with my professional practice or not in connection with it I see or hear in the life of men which ought not to be spoken of abroad I will not divulge as reckoning that all such should be kept secret." The word physician, some believe, is derived

from an ancient word which means to serve, and a physician is therefore one who serves. Now while this service is oftentimes as indefinable as the relation between patient and physician, still it is clearly recognized by law that when a patient employs a physician he enters into a contract with the physician. The physician must use a reasonable amount of skill and knowledge or else he is held accountable by the courts. A patient is held liable by the courts for the bills that he contracts with the physician and is forced by law to pay such bills. The law also recognizes a more subtle relationship, one comparable to that which exists between penitent and priest. Knowledge gained in such a way is held to be sacred and inviolate.

It will soon become evident to anyone who looks at the matter at all thoughtfully that a physician stands in much the same relation to his patient that a builder does to his employer. Few would be so foolish as to ask a builder to construct a house for them and then either refuse to give him true information about the foundation on which he was to build or later make misleading and at times erroneous if not false replies to questions which related to the perfecting of the construction. Nor would they when the building was three-fourths completed try to see if it could stand all the strain that would be expected of it when finished. It would indeed be foolish if during the night they should knock

down a number of bricks from the walls while the builder was not there or injure the property in any of a hundred ways that could be suggested. Some of these may seem possibly to have little bearing upon the relation of physician and patient, but let us see.

When a patient consults a physician the physician supposes that the patient has put himself entirely in his hands to be guided in the matter of his health by the physician's knowledge and skill, whatever they may be. They enter, as it were, into a partnership which has as its aim the recovery of the patient's health. The physician should bring expert knowledge and the patient willingness and ability to carry out his physician's orders. In any business perfect frankness and honesty must exist between the partners. Any patient who does not tell his physician everything related to his health in the past, or who by his misstatements leads him to believe that something is the case which is not, is certainly giving the physician false information about the foundation on which he hopes to upbuild his health. Such false information may mislead the physician but works harm only to the patient.

Patients who think when they are given certain instructions that it is not necessary to carry them out, assume that they know more than the physician. Possibly this may be so. If a patient feels confident that it is so, he should at once

discharge the physician and seek advice from another. Physicians are human and sometimes err, but wide experience teaches that their mistakes can be numbered in the units, while patients' mistakes run into the thousands. In no disease is absolute confidence so important as in pulmonary tuberculosis—confidence of the patient in the physician, confidence of the physician in the patient. Each must look upon the other not as a master at a boarding-school, nor as a proctor at a university, nor again as a policeman in a large city, but each should consider the other as his personal friend, a friend to whom all his troubles can be imparted and halved, a friend with whom his joys can be shared and doubled. Such should be the relations, certainly so far as matters of health are concerned, between physician and patient. No patient can expect the best results until such relations exist. The physician must be his confidant. The physician knows only too well that his patient will err at times, will wander from the straight and often difficult path that leads to health. He expects it, but he also expects that his patient will be frank and will tell him. An honest confession disarms criticism and engenders a feeling of confidence and respect which is worth more to physician and patient than any pecuniary or other reward. A patient can in many ways easily deceive his physician, for the latter may have no opportunity to verify statements nor

have any desire to do so. But in so doing the patient really deceives himself and often brings about conditions which greatly prolong his illness.

Therefore, when you go to your physician, go to him in the same spirit in which one should approach a confessor. You may be certain he will divulge nothing that you tell him. You may rest assured that his advice, based upon a full knowledge of your case and condition and upon what you have done and will do, will be thousands of times more valuable to you than advice based upon insufficient knowledge of the past history of your case or upon insufficient knowledge of your temperament.

Few persons realize how expensive cheap advice may prove to be. No one would take an important case to a lawyer of whom he knows nothing and follow blindly his advice; neither would he consult a business acquaintance at lunch in regard to a legal matter of some importance and try to see if his advice would solve the problem. Such an individual would be extremely foolish. On the other hand, the majority of mankind exhibit a great distaste for consulting a physician of prominence often on account of the fee he charges. Their fortunes must be protected by the best legal advice possible, but their health may be entrusted to the mercy of friends who, while chary about advice as to how to invest $1,000.00, feel fully competent to give numerous

suggestions about health. The money may be replaced, but health once lost is often irrecoverable. When, however, they have followed this well-intentioned but ignorant advice and find too late that they are incapacitated for further work they seek skilled medical advice and then berate the doctors who tell them how long it will take to get back to the place where they were when they first sought advice of any sort.

I often ask patients if when they form a partnership in business they go about asking their friends who are ignorant of the business what they should do. Then why, I ask again, do they often seek and at times follow medical advice from laymen who may be and usually are totally ignorant of the condition of their various organs? Does such blind advice help either him who proffers or him who follows?

XVII

ON CLIMATE

"Of natures or temperaments some are well- or ill-adapted for summer and some for winter."

TUBERCULOSIS is found from pole to pole. No people, no land, no climate is free from the disease, though in some lands it is more common than in others. The Indians about Hudson Bay, the Eskimos of Greenland, the African in his native land, all suffer severely; while in the temperate zone it is a scourge. Tuberculosis is found in every climate and at every altitude, though less frequently in arid or semi-arid lands, on mountains and in the higher altitudes. Brehmer, the founder of the sanatorium treatment of pulmonary tuberculosis, believed in immune zones, districts where tuberculosis was very infrequent or did not occur. Today, however, it is recognized that it is not climate but sparseness of population and difficulty of frequent communication with the outlying world that produces such zones, while density of population with the accompanying overcrowding under insanitary and poor economic conditions plays a far more important part in reducing the

individual resistance to the disease than any possible climatic condition in the temperate zone.

The relation of climate to health is very complex, but a few facts do stand out. Warm or hot moist climates depress many of the bodily functions, the stomach and the intestines are less active, evaporation from the lungs is slight, perspiration is profuse, the kidneys overexcited, all of which produce at times torpor of body and mind. That such a climate is bad for patients with pulmonary tuberculosis is very evident. The severe cold within the Arctic Circle with the many unpleasant symptoms produced, render it a climate to be avoided except in summer. The temperate zones again have marked changes of temperature, which today are looked upon as beneficial to patients who can stand them and meet them intelligently. Strange as it may seem, more severe changes are of daily occurrence in the deserts of Arizona and of Sahara at sunset than occur in colder climates. The most vigorous race of men, some hold, is that which lives far enough north to have to combat a vigorous winter and yet not far enough north to experience scarcity of food. Such cold acts like a healthy stimulant upon body and mind, and the feverish activity of the American people has been attributed to our variable climate.

The value of climate in the treatment of pulmonary tuberculosis rests today largely upon

personal belief and experience, for much has been stated and little proved. Such widely divergent climates as the desert, the mountain-top or the mid-ocean are all good climates, and certain patients thrive wonderfully well under their influence. But it is now clearly recognized that proper treatment is more important than climate and, further, that there is no specific climate. Rainy winds or bad weather may exert some influence upon the onset of tuberculosis, but it is an open question whether by preventing an outdoor life they do not reduce the individual's resistance and so bring about the disease.

Change of climate when it involves change of residence, food, habits, freedom from care and worry, accompanied by properly regulated rest and exercise, is of influence as a preventive or restorative, but such action must not be attributed solely or even largely to change in atmospheric conditions. That climate is best which tempts us most to be outdoors, especially when we expect to reside in it permanently, but to return from a lovely, warm, exhilarating sunny climate where one has spent many hours out of doors to one which is bleak, dreary and sunless is depressing and makes an outdoor existence more difficult.

There are certain localities in all climates which by experience many individuals have found to be stimulating. Such localities are frequented

by numbers of people and become known as summer, winter or health resorts. The benefit derived from these places is to be attributed largely to change of environment and in some instances to a more properly regulated life. Even change from a "good" to a "bad" climate may produce this benefit, and a sojourn in any climate for more than eight or nine months without change is often inadvisable. But here again many factors enter which only the physician can pass upon.

Any patient who seeks a change of climate should make inquiries about the place he selects and obtain a letter, if possible, from his physician to some medical man located there. On arrival he is often stimulated, and for this reason should remain quiet for some time until his physician permits him to walk. He must not expect to alight upon the platform of a health resort and to have a "package" of good health handed him with an insurance against relapse attached to it. There, as at home, the rules mentioned elsewhere in this book and his physician's advice must be conscientiously followed.

XVIII

ON HOW AND WHEN WE CONTRACT TUBERCULOSIS

"Knowledge comes but wisdom lingers."

When through knowledge the time comes that we fear not for the pestilence that walketh in darkness, nor for the sickness that destroyeth in the noonday, then the need for sanatoriums and for such books as this will be done away with. Until that time, however, we must ceaselessly strive to increase our meagre knowledge of the spread of disease, and having acquired a little more, must put it as soon as possible into practical use.

The idea of contagion is centuries old, and 100 B.C. we find it suggested that animalculæ, invisible to the naked eye, may bring about disease. Everyone has no doubt heard many times of infectious and of contagious diseases. An infectious disease is one in which the cause of the disease gains entrance into the body and multiplies there, giving off poisons. Contagion relates to the method of transmission of the disease from the infected person to the well. From this it can be readily seen that a contagious

disease is a communicable disease. While I have not time to discuss it, it may be said that not all infectious diseases are communicable.

What concerns us now are the methods of transmission of disease in general and of tuberculosis in particular. First, a number of diseases, and among them tuberculosis, may be transmitted through the air. Second, some diseases require a peculiar form of direct personal contact for transmission. Third, a few diseases are conveyed from one person to another through food or water, very rarely by personal contact or by air; for instance, typhoid. Fourth, many diseases, such as malaria and yellow fever, are transmitted by insects. Fifth, some diseases can be acquired only by an injury of the body, never by contact without injury. Here are lockjaw and hydrophobia.

We must next consider how these germs (for I shall limit this chapter to diseases caused by germs) gain entrance into the body. The most common entrances are through the skin, the membranes of the eye, nose, mouth, tonsils, lungs, stomach and intestines. When the disease is air borne it can enter through any of the portals, but in the case of tuberculosis most usually through the respiratory tract or lungs, or when through food, through the mouth, tonsils or intestines. I refer especially to milk from tuberculous cows.

If we devote our attention more particularly

to tuberculosis we see that there are two great sources of infection: first, man, and second, cattle. While the tubercle germs from cattle affect chiefly children and cause only some 8 or less per cent of the deaths from tuberculosis, nevertheless they kill about 9000 persons in the United States each year. The germs enter the body practically always in the milk drawn from a tuberculous cow. It would seem to be a simple matter to rid our cattle of tuberculosis, but the cost would be so great that it appears impracticable to attempt it today. Man, however, is the source of infection of man in at least 92 per cent of all cases, and it is necessary that we should study how this takes place. While some of the secretions of the body do contain some tubercle germs, it has not yet been shown that any of them plays an important part in comparison with the sputum. The sputum is unquestionably the source of infection in almost all of the 92 per cent which I have mentioned. Sputum is usually coughed up, and in the course of twenty-four hours a patient may expectorate billions of tubercle germs. During this act of coughing a fine spray is emitted from the mouth, and may go for a distance of four or five feet from the cougher. This spray may contain tubercle germs, and anyone coming within this radius may inhale them. Most of these droplets, however, must fall to the floor, where they quickly dry. The sputum contains mucus, which when

dry is very tough, and it requires considerable force to dislodge dried sputum from even a smooth surface. Many men are careless about spitting upon the floors of cars, of public buildings or upon the sidewalks. In the last case, fortunately, the tubercle germs are quickly killed by the light and air, but before that has come about we may contaminate our shoes and skirts and so carry the germs into our homes. Here by one process and another the sputum is finally reduced to dust, and thanks to our darkened houses the tubercle germs may escape death from light. Being incapable of motion they lie in some dark corner for the mistress of the house or for the maid to stir them into the air by dry sweeping. If perchance they fall upon some piece of furniture they are again given a chance, as Dr. Osler says, by that pernicious process aptly termed dusting. When each tiny particle of dust can carry a dozen or more of these germs we see how readily they can be breathed in, for it requires from one to eight hours for the dust to settle completely, a strong argument in favor of the vacuum cleaner. From what I have said it can readily be seen that tubercle germs need protection from light and air, which will kill them, and this they gain in the house. For this reason tuberculosis has been called a house disease. The sputum deposited upon the sidewalks or even in the gutters of our crowded cities may contaminate

the playthings, the balls, tops, marbles, etc., of our children. These objects transfer the germs to the mouths and hands and infection can take place through tonsil, intestine or elsewhere.

We must now turn our attention to the persons who become infected and attempt to see how and when this may occur. It might be stated at the outset that no person is so resistant to the disease that he cannot acquire it if he gets into his body a sufficient number of the germs. Again, it is readily seen that when this person's powers of resistance are weakened, fewer germs are needed to infect him. There is much evidence to show that young animals and children have less powers of resistance to the tubercle germs than adults. Many reasons, which we cannot enter into, have been advanced to explain this. The child lives, however, nearer the earth and the dust than his elders. He creeps on the floor and mouths all objects that he can get into or near his mouth. Dirt has no terror for him and he no repugnance for it. They are often constant companions, and if perchance he lives with infected dirt his chances of infection are nearly 100 per cent. Figures have been published to show that in some large European cities in nearly every child before the age of fourteen tubercle germs have found a lodgment. In infants, when they cause tuberculosis which is discoverable, the outlook is gloomy. It has

been estimated that 80 per cent of infants infected in the first year die from tuberculosis, while death occurs in only 20 to 30 per cent of those so infected in the second year of life. In the later years of childhood, the outlook for discoverable disease is brighter. But as I said before, from 50 per cent to 100 per cent of all children who have reached their fifteenth year have gotten tubercle germs into their bodies. These children are infected, as we say. As only one in seven to one in ten of all persons dies of tuberculosis, many of these must recover from the infection, or holding it in check, finally succumb to other diseases. This lodgment of tubercle germs, this infection, must have some effect upon the person, and it is interesting to try to find out what it is. It is well known what tuberculin is, the poison of the tubercle germ, and that when it is injected in moderate amount into the body of a healthy person it produces no results. This is also true of children. The first effect of the tubercle germs when once in the body is to change it so that it reacts, as we say, to tuberculin. Remember that it is impossible to make a man or baby or animal without tubercle germs react to tuberculin. This, then, is the first effect.

The next question is: What becomes of the tubercle germs? We know that in the vast majority of cases they produce no discoverable disease. Do they die or do they smoulder along like fire in cotton, waiting for a suitable moment

to burst out? It has gradually been proved that to make an animal resistant, or immune, as we call it, to tuberculosis, we must inject living tubercle germs. If this is so, these infected children may be more or less immune so long as the tubercle germs remain alive. This means that they can resist fresh doses of new tubercle germs, provided the doses are not too large. The children grow up and possibly for one reason or another, such as overstudy, too little sleep, poor food, stale air or what not, become run down. Their immunity or resistance is greatly lessened and they become liable to fall a prey to their own tubercle germs which they have housed for years, or to the germs of another, which some believe is less likely to occur. This unfortunate accident occurs most frequently between the eighteenth and thirtieth years. Symptoms develop and attention is drawn, say, to the lungs where is found a deposit of germs which came from the original point of infection, usually a (lymph) gland. The older a person becomes after twenty-five, the less likely is he to develop tuberculosis. After adult life is reached the number of germs necessary to produce an infection is very much larger, and, furthermore, it seems often necessary that the resistance of the person so exposed must be reduced for an infection to take place. The resistance can be reduced by overwork, great mental anxiety, worry, nursing some member

of the family, poor food, poor air and a thousand and one other things. For years I have felt that we do not know all there is to be known about contagion and tuberculosis. Many thought and some still think heredity might play a part. By this I mean not the inheritance of the tubercle germ, but of lessened resistance to it. It may play some part and should make us more careful about exposure of such children. Picture a child born into a family where the father is ill with pulmonary tuberculosis. He cannot work and sits about the house and spits, not always into the stove or cuspidor. The dirt on the floor becomes infected with tubercle germs. The baby, with lessened resistance through poor inheritance, poor air, poor food, creeps in this infected air on the infected floor and the result is quickly manifested. The older children develop bone or gland tuberculosis and later possibly pulmonary tuberculosis.

It might be asked on what evidence much of this is based. It has been slowly accumulating for years, and today we have a large amount of experimental work on animals that goes to prove what I have said. That infection in adults is rare is proved by the number of nose and throat specialists who after years of work with tuberculous patients, escape discoverable tuberculosis. In Brompton Hospital in London, where a large number of doctors have for years cared for tuberculous patients, the number of doctors who

developed pulmonary tuberculosis is astonishingly small. Of 376 internes in the City Hospital in Chicago (Cook County), where tuberculous patients were in all the wards, only one in twenty developed pulmonary tuberculosis, whereas in the general population one in ten dies from it. These persons were especially exposed to tuberculosis. Some years ago we attempted to prove that adults could be infected. We wanted to find two closely associated but unrelated adults and chose to study man and wife, one of whom was tuberculous. We collected over 40,000 couples, one partner of each couple being tuberculous, and Mr. Pope, a statistician, studied them. Allowing for the one in ten who becomes tuberculous under any conditions, we had very great difficulty in proving infection for the small remainder. On the other hand, I do believe there is some though not great danger for adults. This is suggested by the fact that when healthy milch cows are associated in a barn with tuberculous cows, sooner or later most of them become infected.

Now to recapitulate: We have seen that, roughly speaking, tuberculosis is spread from cattle to man in 8 per cent, but from man to man in 92 per cent. Sputum in the form of dust or droplet or by means of moist contamination is the chief source of infection. We must not relax in the slightest our efforts to destroy all germs as they leave the body. We have learned

that young animals and children are many, many times more prone to tuberculous infection than adults. We must redouble our efforts to protect infants and children, and what is not less important, we must see that the resisting powers of adults are not lowered by circumstances over which they have no control, such as long hours of work, working under poor hygienic conditions, and the many other factors that I have mentioned. In fact, it is likely that adults must have a very large dose of germs or have lessened resistance to become infected at all.

In conclusion I would say that I believe the most efficient methods of combating tuberculosis now at our disposal are: The greatest protection of children during the first few years of life, and the maintenance, especially from the fifteenth to the thirtieth year, of the individual's resistance to disease.

XIX

ON THE CARE OF CHILDREN IN THE HOMES OF THE TUBERCULOUS

"Forethought will often save much afterthought."

The belief that tuberculosis is acquired nearly always in childhood and that after lying dormant for many years it breaks out again as tuberculosis of the lungs, most often between the eighteenth and thirtieth years, has been accepted by many prominent students of the disease. Whether tuberculosis is due to an outcropping of the early infection or to a fresh implantation of germs, we know that tuberculosis is a very deadly disease among infants. Some have claimed that 70 to 80 per cent of infants under one year of age who contract tuberculosis die from it. The disease is very much less fatal in the second year of life and from this time on becomes less dangerous and even runs a more favorable course than in adults.

Some investigators have stated that in some large European cities among the poorer people nearly every child (95 per cent) by the age of fourteen or fifteen years has gotten the tubercle germ into its body, but in the vast majority it is

dormant. In one of the large American cities only one-third of such children were found to harbor this germ.

On the basis of such statements, it is easy to outline what we should do theoretically but difficult to carry it out practically. It might be well, however, to state the ideal conditions and from them draw what practical help we can.

From what has been said it readily follows that the greatest effort to protect the infant, baby and child from the tuberculosis germ should be exerted during the first four years of life and particularly during the first year. During this first year of life the baby possesses no power of locomotion and the problem is far simpler then than later when he begins to walk and play about. Thereafter it appears that sooner or later he comes in contact with the tuberculosis germ. If he be protected carefully during the first two or three years it is probable that he will develop normally if his inheritance be good. Some have suggested that the long, narrow chest is due to infection (implantation with the tubercle germ) before the third year. In any case we know that it makes a great difference whether the child gets its first tubercle germs in its first or seventh year.

In the first place, we can learn from the handling of calves born of tuberculous cows that when they remain with their mothers even a very short time the tubercle germ gets into their

bodies. If, on the other hand, they are removed at birth from their tuberculous mothers and brought up so that they do not come in contact with the tubercle germ they become healthy cattle. Theoretically this should be done for one and one-half years with infants whose mothers are tuberculous, but practically it is generally impossible to bring this about. However, for the sake of the mother as well as for the child she should not nurse her infant. It should be brought up in a room apart from hers; she should not kiss it nor cough near it, nor should she allow it upon her bed even for a short time. In fact, it should be with her as little as possible until her disease is arrested and the tubercle germs disappear from her sputum. The use of her handkerchief or of eating utensils which she has used should be absolutely forbidden. These rules, of course, apply to a tuberculous father, who should not be set to care for the baby.

The domestics, and particularly the nurse, should be healthy. The nursery should be inviolate, and visitors or the family with dirty or dusty skirts and shoes should be kept out. The baby may be taken to the parlor to see visitors. The floor of the nursery should be kept scrupulously clean, for soon the baby creeps and crawls everywhere upon it. What is on the floor is quickly on his hands and under his nails, and what is on his hands is shortly in his mouth.

Again, very little draught stirs up the dust on the floor just high enough to enable the youngster to inhale it. Where there are cracks there is dust, and tiles (a heated tile floor) make the ideal thing for a nursery.

These conditions are ideal and can be provided in few homes. In fact, in many there can be no nursery and under such conditions a blanket, so marked that one side is always placed upon the floor, makes a good place for the baby to crawl upon. Dry sweeping or dry dusting should not be used where there is a baby.

The time, however, soon comes when the child begins to walk and to play out of doors, and then it is impossible to prevent sooner or later his coming in contact with the tubercle germ. Fortunately every year he is better able to resist it.

Another important source of danger to babies is the milk which comes from tuberculous cows. No price is too great to pay for pure milk, and in milk, as in other things, we get just what we pay for. A large amount of the tuberculosis in children has been found to come from milk from tuberculous cows. The cows should all fail to react to tuberculin and the milk should fall in Grade A, that is, have relatively few other and no tuberculosis germs. When such ideal conditions cannot be fulfilled, the milk should be properly pasteurized and very carefully kept, for germs grow as rapidly in pasteurized as in raw milk.

We have seen now what a great struggle should be made to keep the infant and the young child and the tuberculosis germ apart, and we have seen that it is exceedingly difficult. As they grow older we must take it for granted that from one-third to nineteen-twentieths of all children get these germs into their bodies. Now our problem changes, and added to the struggle to keep out the tuberculosis germs must be added the fight to keep those which have gained entrance from multiplying and producing disease as we recognize it in everyday life. This is accomplished by raising the resistance of the child to all diseases. Good air and good food are prime essentials. The effects of the good housing laws and of the model tenements are now well established, but the work of the open-air schools and medical inspection of school children have not yet been fully felt. Both are powerful factors in increasing the child's resistance to the advance and multiplication of the tuberculosis germ already within it, as well as to the implantation of these germs. For predisposed children hyperventilation is necessary and school should not be begun too early. Care of the mouth, throat and nose is important, but for a child which harbors the tuberculosis germs the most strenuous efforts should be taken to avoid measles and whooping-cough — especially must this be done when the child is still under three or four years of age. If unfortu-

nately they occur in such children, the children should be treated for some time as if they already had tuberculosis as a disease. An important point is to teach early to these young people the value of self-restraint and unselfish and self-denying habits. An outdoor life at all times should be encouraged, but indulgence in sport be kept within their strength, and the danger of injuries not overlooked as a predisposing factor. Fresh air should be supplied to these children in large quantities day and night.

"The Modern Health Crusaders," a system of teaching good health habits to children over five years of age, requires that 75 per cent of the health chores (weighing once a week, eating regularly and slowly wholesome food, drinking milk, going to the toilet regularly, in bed ten or more hours each night, lying down twenty or more minutes each afternoon and morning, as directed, playing and exercising in the fresh air, washing the hands before each meal, brushing the teeth thoroughly after breakfast and after the evening meal, taking the specified number of baths) must be carried out for twenty or thirty weeks, in order for the child to be enrolled as a Modern Health Crusader with the title of Squire, provided that he has agreed to do nothing that might hurt the health of any other person, to help keep home and town clean, and to keep the Crusaders' health rules until the end of December following the school year. For

undernourished children a nutrition chore is added, and the child told what he should weigh for his age and height. For children who have been exposed to the tuberculosis germs, for children who are poorly nourished, this scheme cannot be too highly recommended. Full details can be obtained by writing the National Tuberculosis Association (see page 63).

HEIGHT AND WEIGHT TABLE FOR BOYS.

Height, inches.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.	15 yrs.	16 yrs.	17 yrs.	18 yrs.
39	35	36	37											
40	37	38	39											
41	39	40	41											
42	41	42	43	44										
43	43	44	45	46										
44	45	46	46	47										
45	47	47	48	48	49									
46	48	49	50	50	51									
47	..	51	52	52	53	54								
48	..	53	54	55	55	56	57							
49	..	55	56	57	58	58	59							
50	..	..	58	59	60	60	61	62						
51	..	..	60	61	62	63	64	65						
52	..	..	62	63	64	65	67	68						
53	..	..	..	66	67	68	69	70	71					
54	..	..	..	69	70	71	72	73	74					
55	..	..	..	..	73	74	75	76	77	78				
56	..	..	..	..	77	78	79	80	81	82				
57	..	..	..	..	..	81	82	83	84	85	86			
58	..	..	..	..	..	84	85	86	87	88	90	91		
59	..	..	..	..	..	87	88	89	90	92	94	96	97	
60	..	..	..	..	..	91	92	93	94	97	99	101	102	
61	..	..	..	..	..	..	95	97	99	102	104	106	108	110
62	..	..	..	..	..	..	100	102	104	106	109	111	113	116
63	..	..	..	..	..	..	105	107	109	111	114	115	117	119
64	..	..	..	..	..	..	..	113	115	117	118	119	120	122
65	..	..	..	..	..	..	..	..	120	122	123	124	125	126
66	..	..	..	..	..	..	..	..	125	126	127	128	129	130
67	..	..	..	..	..	..	..	..	130	131	132	133	134	135
68	..	..	..	..	..	..	..	..	134	135	136	137	138	139
69	..	..	..	..	..	..	..	..	138	139	140	141	142	143
70	..	..	..	..	..	..	..	..	..	142	144	145	146	147
71	..	..	..	..	..	..	..	..	..	147	149	150	151	152
72	..	..	..	..	..	..	..	..	..	152	154	155	156	157
73	..	..	..	..	..	..	..	..	..	157	159	160	161	162
74	..	..	..	..	..	..	..	..	..	162	164	165	166	167
75	..	..	..	..	..	..	..	..	..	..	169	170	171	172
76	..	..	..	..	..	..	..	..	..	..	174	175	176	177

HEIGHT AND WEIGHT TABLE FOR GIRLS.

Height, inches.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.	15 yrs.	16 yrs.	17 yrs.	18 yrs.
39	34	35	36											
40	36	37	38											
41	38	39	40											
42	40	41	42	43										
43	42	42	43	44										
44	44	45	45	46										
45	46	47	47	48	49									
46	48	48	49	50	51									
47	..	49	50	51	52	53								
48	..	51	52	53	54	55	56							
49	..	53	54	55	56	57	58							
50	..	..	56	57	58	59	60	61						
51	..	..	59	60	61	62	63	64						
52	..	..	62	63	64	65	66	67						
53	..	..	..	66	67	68	68	69	70					
54	..	..	..	68	69	70	71	72	73					
55	..	..	..	..	72	73	74	75	76	77				
56	..	..	..	..	76	77	78	79	80	81				
57	..	..	..	..	..	81	82	83	84	85	86			
58	..	..	..	..	..	85	86	87	88	89	90	91		
59	..	..	..	..	..	89	90	91	93	94	95	96	98	
60	..	..	..	..	..	..	94	95	97	99	100	102	104	106
61	..	..	..	..	..	..	99	101	102	104	106	108	109	111
62	..	..	..	..	..	..	104	106	107	109	111	113	114	115
63	..	..	..	..	..	..	109	111	112	113	115	117	118	119
64	..	..	..	..	..	..	..	115	117	118	119	120	121	122
65	..	..	..	..	..	..	..	117	119	120	122	123	124	125
66	..	..	..	..	..	..	..	119	121	122	124	126	127	128
67	..	..	..	..	..	..	..	..	124	126	127	128	129	130
68	..	..	..	..	..	..	..	..	126	128	130	132	133	134
69	..	..	..	..	..	..	..	..	129	131	133	135	136	137
70	..	..	..	..	..	..	..	..	..	134	136	138	139	140
71	..	..	..	..	..	..	..	..	..	138	140	142	143	144
72	..	..	..	..	..	..	..	..	..	..	145	147	148	149

The tables of average weights for boys and girls, according to their height and age (of their nearest birthday) were prepared by Dr. T. D. Wood from figures supplied by Dr. L. E. Holt, and are published by the National Tuberculosis Association. The average gain in ten weeks from the fifth to the eighth year should be one pound; from the eighth to the twelfth year, one and a quarter pounds; from the twelfth to the fourteenth year, one and three-quarter pounds; from the fourteenth to the sixteenth year, one and a quarter pounds for girls, two and a half for boys; from sixteenth to the eighteenth year, one and a quarter pounds for boys and one-half pound for girls.

Playgrounds should be established at any expense for in promoting not only health, but initiative, coöperation, ambition, honesty, im-

agination, self-confidence, obedience, justice, they diminish the evil tendencies of the cities by preventing idleness, exclusiveness, unfairness, selfishness, gang-spirit, temptation, rowdyism and other faults which line the path to the hospital and to the reformatory.

XX

ON TUBERCULIN

"Science is a river with two sources: the practical source and the theoretical source."

The extensive use of tuberculin both in diagnosis and treatment of tuberculosis has aroused much interest among patients who have fallen ill of tuberculosis. Naturally their first inquiry is: What is tuberculin? This is best answered by describing its preparation. The tuberculin first discovered by Koch is still so widely used that its preparation will be described. Tubercle bacilli are allowed to grow on beef broth for five or six weeks. The fully developed growth is then boiled for an hour, (which kills all the tubercle germs), evaporated down to one-tenth of its original volume and filtered through porcelain (which allows no tubercle germs dead or alive to pass through). This clear brown fluid contains no tubercle germs but only the substance extracted from their bodies through boiling and possibly the product secreted by the germs in their growth. There are many other tuberculins in use, but it will be of no help to us here to discuss in endless detail slight variations.

This form of tuberculin, then, is an extract of the tubercle germs. It is not a serum which comes from the blood, not an antitoxin. To prepare diphtheria antitoxin, the diphtheria toxin (a name for a variety of poison) obtained from diphtheria germs is injected into the horse. The horse's body is stimulated then to form substances which combat the toxin. These substances are contained in the blood serum and are called antitoxins. When injected into the body of a child ill with diphtheria, they neutralize the diphtheria poison, and the child is enabled to recover. While many attempts have been made to obtain such an antitoxin in tuberculosis they have all failed. From what has been said about the effect of antitoxin in the child, it is clearly seen that the child's body is not called upon to form any new substances but is merely passive; this form of immunity (*i. e.*, the ability to resist disease) is called passive immunity. The horse which formed the antitoxin, on the other hand, had active immunity, for its body created or formed immune bodies. The child could be desperately ill and the antitoxin would save its life, but only when the horse is in good condition can its body form much antitoxin.

Now tuberculin is a poison, and only when the body is in fairly good condition can it respond favorably to tuberculin, which must be given very carefully. To obtain the best results necessitates considerable study and experience and

great frankness on the part of the patient with his physician. No matter how little his symptoms or feelings deviate from their usual course they should be recorded and reported. Just how tuberculin acts is not fully understood, but a safe method of giving it has been devised. In a small number of patients the results from the use of tuberculin have been remarkable; another small group cannot tolerate it, but the vast majority take it well, although they experience apparently little benefit from its use. When given carefully it may help the patient and will do him no harm.

The author devised a tuberculin record book which enables a patient to record accurately his condition so as to help his physician not only in regard to the use of tuberculin but also in his general treatment. These little books can be obtained from the National Tuberculosis Association (370 Seventh Avenue, New York City, price 25 cents).

XXI

ON THE DISEASE TUBERCULOSIS

"When a man's knowledge is not in order, the more of it he has the greater will be his confusion."

CURIOSITY, termed at times, more politely, a spirit of investigation, activates or lies dormant in most of us. It is, therefore, natural that patients who for months live in the open, sitting much on porches, conversing on many subjects, should dwell occasionally on what is uppermost in their minds, tuberculosis. What is it? What causes it? Why is it so called? These and a thousand other questions arise in those with active minds, and some attempt will be made here to answer a few of them. It must be remembered, however, that it takes a good preliminary education, four years in a medical school and a year or two in a hospital, before a physician is in any position to comprehend all these problems and answers. Indeed, some patients seem to think that even after many years some physicians fail utterly to understand the disease and that their own knowledge of it is far superior. The fallacy in this lies in the fact that the physician has many diseases to think of, the patient

but one, and he attributes the symptoms of many other diseases to this. But however this may be, the fact remains that many years are required before the disease in all its bearings is fully understood by those who have already studied medicine. It seems needless then to add that it is impossible to impart to any patient without this preliminary study in a few minutes or a few hours what others with such study often fail to grasp. The conclusion from all this is the fact that the patient must not expect that his knowledge of these facts will become in a short time so accurate that he can base his course of action upon them. Of course, many empirical rules are laid down in the other chapters of this book, but what is said here relates to the underlying pathological and anatomical changes in the body brought about by the tuberculosis.

The name "tuberculosis" or "tubercle" is the diminutive form of "tuber," a swelling or knot, and hence tubercle means a little swelling. We speak of potatoes as tubers because they are swellings upon the roots of the potato plant. The cause of this swelling in the lung is the "tubercle" germ, and without this germ there can be no tuberculosis. When the tubercle germ is inhaled or swallowed and reaches in some way the lung, it poisons the lungs and they react against it and try to wall it off. In this process a little swelling is formed, and this swelling is called a tubercle. After a little while the

body attempts to inclose this within a scar. The scar tissue at first is very delicate, almost like a spider web, but later gets stronger and stronger and walls off the tubercle germ, which has by this time multiplied into a number of tubercle germs. Many of these germs lie in cells which attempt to wander through the scar wall, carrying the germs with them. Now when the body is overcoming the disease the scar is so strong that the germs cannot escape through the wall, but if the germs can so poison the body that the scar wall dies before a larger wall can form without the first, then the disease advances and spreads. When the latter takes place the former process also often occurs. When the body is gaining the ascendency lime salts (calcium) are deposited at times in the tubercle and form, so to speak, its gravestone.

This is the history of the single swelling or tubercle, but many occur in the lung before we can detect the evidences of disease. The lung then looks like an apple which has scattered in a small part of it little yellow spots of decay. No part or only a microscopic part of the lung is lost and all about the swellings there lies good lung which we use. If the disease advances and the swellings become so numerous that a part of the lung is so destroyed that it can never again be of use to us Nature steps in and cuts it out. If the very end of one's finger had become so full of tubercle germs that the bone was

destroyed and it could not be used, but remained a source of danger, the natural decision would be to have it amputated. When Nature or the body's forces cut off a bit of the lung they are acting in the same way. The result of such a process is a hole or a cavity which we can readily see is, after the disease has reached a certain stage, the first step toward healing. This hole is surrounded by a scar which gradually shrinks and contracts the cavity.

In some patients more scars form than in others, and as these scars shrink the lung cannot expand so freely, nor can it take in as much air as formerly. The result is the patient is somewhat short of breath, due to the healing process.

It may not be amiss to speak in a few words of the physiology of the lungs. The body is composed of millions of tiny units called cells which, highly specialized, carry on the various works of the body. In each of these cells combustion of the food products is carried on. Waste consequently accumulates and must be removed. This is done by the blood which carries it to the kidneys, where part is thrown out of the body, and to the lungs, where carbonic acid gas is given off in the exhaled air. Now for combustion oxygen is necessary and the cells must be supplied with it. The blood absorbs it from the air in the lungs and carries it to the cells which need it. Fresh air perhaps makes the work of the lungs easier and possibly reduces

the number of breaths necessary, but when no irritating substances are present fresh air acts no more upon the lungs than upon the liver or muscles of the leg. While this is so it must be remembered that fresh air is essential for the well-being of all parts of the body in good health, and vitally so during disease.

XXII

ON DEFINITION OF "CURE" AND "ARREST" AS USED IN THE TREATMENT OF TUBERCULOSIS

"Call things by their right names."

THE following medical terms are used in a meaningless way by many laymen. It is always a doubtful procedure to attempt to instruct patients in their use, but as it is impossible to prevent their use a few words about them may in a way clear the situation. From the earliest times to the present, physicians have attempted to classify all patients with pulmonary tuberculosis into three classes or stages: The first class includes patients in the very earliest or incipient or minimal stage (which term relates less to the time the patient has had the disease than to its extent and its ravages), the third class contains the patients in the later or far-advanced stages, and the second, by far the largest class, embraces those in the middle or moderately advanced stage.

Twenty-seven years ago it was difficult for anyone, even a physician, to believe that a patient ill of pulmonary tuberculosis ever recovered.

When the treatment of the disease, described in other chapters, was inaugurated it became necessary to convince the public that many patients did recover, for to extend the struggle against tuberculosis it was necessary to build many sanatoriums, and their construction depended upon the generosity of the public. For this reason, even against the better judgment of some medical men, the term "cured" was used in connection with patients who had apparently recovered. It was true that for a time the modifying word "apparently" was used, "apparently cured." Soon, however, it was realized both by physicians and laymen that "cure" in tuberculosis meant something far different from what is meant in measles, smallpox, pneumonia or any one of a dozen other diseases. The "cures" or "apparent cures" returned home or to work, and, alas, a certain number of them fell again into their hygienically evil ways and met shortly the fate of such transgressors. This led to many articles upon such topcis as: "Is Such Treatment of Tuberculosis Worth While?" The outcome of it all was that a strong opposition arose to the terms "cured" and "apparently cured," for the opponents said they created an erroneous impression upon the public and lulled the patients into a false sense of security. The ultimate result in both instances was deplorable, for the public said: "The physicians call these patients 'cures,'

and see how quickly they relapse;" and the patients said: "Why did they lead us to believe we were 'cured' when they knew we might not be?" The final outcome of the matter was that the term "apparently cured" is now applied only to patients who have been at home working under ordinary conditions of life for two years, and even then stress, much stress, must be laid upon "apparently." Today patients are said to have their disease "apparently arrested" or "arrested," for that is all that a physician can honestly say. If a patient keeps well indefinitely he is cured; if he relapses after one, two or three months of strenuous life, or even after a year or two, he belonged to the vast multitude of those with their disease arrested. Today as many, and in all probability more, patients are "cured" than ever before, but the writer wishes to emphasize the fact that no one can say when a patient passes from a condition of arrest into that of cure.

XXIII

ON THE HYGIENIC CARE OF THE PATIENT

"I am a man: I hold that nothing which concerns mankind can be of indifference to me."

EVERY patient with tuberculosis has certain duties and obligations that he should perform to protect his family, his friends and all those with whom he comes in contact. On the other hand, these persons have certain obligations to such a patient, not least among which is the dissipation of foolish fear about contagion from a careful patient. He who collects and destroys his sputum, who covers his mouth when coughing, can be of no source of danger to anyone.

Many laws have been passed prohibiting spitting wherever anyone must tread. It is not sufficient, however, to pass such laws; an intelligent sympathetic public opinion should be created to enforce them. The "arrested" patient should heartily uphold all such measures, for his training has taught him that many apparently well persons who spit have tuberculosis, and a belief that one is well affords no excuse for breaking such laws. If one must spit he should always spit in some receptacle provided

for the purpose or in running water. Moist tuberculosis germs cannot leave the moist surface except under peculiar conditions, *i. e.*, coughing, which will be mentioned later. The danger of contaminating children's playthings with sputum deposited even in the gutter must never be forgotten.

Every patient should know about the disposal of sputum. In the first place, it is necessary for a patient who expectorates to have with him constantly some sort of receptacle to hold the sputum until it can be destroyed. While in bed or on the porch nothing is better than the ordinary individual sanitary cuspidor, constructed of a tinned iron frame, holding a thick waterproofed paper cup, folded in such manner that flanges prevent spilling if accidentally overturned. Each day, or oftener if necessary, the filler is removed, filled with sawdust, wrapped in paper and burned in the furnace or stove. The metal frame should be washed with a 5 per cent solution of carbolic acid. Several types of good waterproof paper pocket cups have been devised, and a patient should never be without one. These, too, should be wrapped up and burned. The use of small pieces of cheesecloth or paper napkins is not so cleanly but is permissible when a patient is confined to bed. Each piece of cloth or napkin should be used but once, then folded and placed in an ordinary paper bag (obtained at the grocery), pinned on

the side of the bed or mattress. This should be removed daily and burned. Such a method eliminates all handling of infected material by anyone but the patient. Much needless fear prevails among the laity about getting a little sputum upon the hand. It can be of no possible source of danger (provided it does not get into a scratch or wound) if the hands are carefully washed with soap and water.

To make a practice of expectorating into a handkerchief is inexcusable and dangerous. It has been said that the only dangerous germ is the dry germ, for only the dry germ can get into the air. Sputum in handkerchiefs quickly dries on account of the heat of the body, and if the handkerchief is used again some of the sputum becomes in part pulverized, and when shaken in the air tends to disseminate as dust. When this soiled handkerchief is used to blow the nose upon the dried sputum may gain entrance into the lungs through the deep breath that usually precedes such an act. The Chautauqua Salute (the waving of handkerchiefs) should be abolished. If at any time the handkerchief must be used to receive sputum it should be burned.

The writer believes that colds may be disseminated by the careless use of handkerchiefs, and even by the prolonged use of a handkerchief an individual may possibly reinfect himself. Colds, grip and influenza are all contagious, and a person suffering from one of them should not be allowed to come near a patient.

The only dangerous germ is the dry germ, but there is one exception. When a patient coughs or sneezes he may cough or sneeze out a spray and the spray may contain the germs which have brought about the cough. This is true for grips, colds, bronchitis, influenza, diphtheria, pneumonia or tuberculosis. The little germ-laden droplets may go for a distance of three or four feet from the cougher and may remain suspended in the air for one-half to one or more hours. Anyone who inhales these droplets would inhale any germs they contain. Fortunately the effect of light and air is such that the germs are quickly weakened and destroyed. But it is not necessary that the germs should escape into the air. A piece of cheesecloth of two or three thicknesses held over the mouth will filter out and catch all these droplets and germs. At the end of the day or oftener the cloth may be burned. It should never be shaken, and it is advisable to have a second piece to use as a handkerchief. Another practical point is that patients' chairs or beds should be at least four feet distant one from another.

The patient should, of course, exercise scrupulous cleanliness about his person, linen and clothes. As soon as a diagnosis is made it may be of value to disinfect the patient's clothes and his room, for previous to the diagnosis he may not have used sufficient care. If a patient wears a mustache or beard it should be closely cropped,

for sputum may get on it, dry, and so be a source of danger to himself and others. Kissing must be given up. He should wash his hands frequently. He should have whenever possible and feasible a room to himself, but separate dishes and silver are not necessary if they are washed carefully and scalded with boiling water and polished. The room may contain a few pictures and rugs. Washable curtains are permissible. Dry dusting or dry sweeping is inexcusable.

The skin is crowded with tiny bloodvessels in whose walls are still smaller muscles which narrow or dilate the bloodvessels. Through the contact of the blood in these tiny vessels and in lungs with the air the body loses heat. In colder air the skin blanches through the contraction and in hot air it becomes reddened through dilatation of these bloodvessels. To meet sudden changes of temperature these tiny vessels must be quickly contracted or dilated, or otherwise we become chilled or overheated and catch cold. We must strive to keep the muscles of these bloodvessels in good condition to avoid these mishaps. We can best do this by washing with hot water and quickly sponging off with cold. The neck, arms, chest and back should be treated in this way every day, but the room must be at least 60°. Twice every week a hot bath, using plenty of soap, should be taken, followed by a cold sponge, per-

formed in cold weather while still standing in the hot water. Every patient should begin to sponge himself as soon as possible, but his physician must decide when he should begin.

It is of interest to recall here that the benefit of living in the fresh air is effected through its action on the skin and not on the lungs. (See page 59). For this reason it is most important to keep the skin in the very best condition possible in order to get the most out of the treatment. The skin of the athlete, of the wrestler, of the football player, of the boxer, should receive no more attention than that of the patient, and each should show if possible the ruddy glow of health.

We have spoken of many facts the individual patient should know; of many things he should do to protect others, and yet there remains one more duty that he should not neglect. He can no doubt recall how little real knowledge he had about the spread of the disease when he fell ill and possibly what a difficult time he had to acquire it. These facts should impress upon him the necessity of enlightening others along these lines, and he may welcome a word or two about how this can be accomplished. The workers against tuberculosis, physicians as well as laymen, some years ago banded together to do more effective work, forming the National Tuberculosis Association. This society meets once a year, usually in Washington in May, and publishes in

its Transactions papers and reports on all phases of the struggle against tuberculosis. Every patient who can do so should send $5 to the Association, at 370 Seventh Avenue, New York City, and become a supporter of this important work. Having thus made a good beginning he should endeavor to find out about the antituberculosis campaign in his community and join whatever organizations there are fighting against the disease or strive to awaken interest in such a fight. He should always bear clearly in mind that while the physician may lead or at least direct the way, the real work must be done by laymen. He should further back up the Board of Health, for whatever improves the general health of the public reduces the amount of tuberculosis. For the same reason, better housing, better working conditions, better conditions in schools, open-air schools for children threatened with decline, are among the many agencies which should enlist his support.

XXIV

ON THE CARE OF THE MOUTH

"Out of thine own mouth will I judge thee."

THE stomach has been described as the bulwark in the individual's fight against tuberculosis. If this be true, and it is in part at least, should we not look to our first and second lines of defense, the gums and teeth? More than 80 per cent among civilized races are said to suffer from dental caries (decayed teeth). Sound teeth and a healthy mouth are necessary to maintain health, and are of much more importance in tuberculosis patients. Decayed teeth prevent perfect mastication and may lead to aches and abscesses that greatly upset the even tenor of a patient's way.

The mouth harbors constantly germs of many sorts, and at times those that produce pus and are capable of producing blood poisoning, as well as the diphtheria germ and the pneumonia germ. These germs are found in greater numbers in patients with uncleanly mouths, proof that cleansing the mouth reduces greatly the number of its germs. It has long been recognized that it is impossible to render the mouth sterile for

any period of time, but it is well known that wounds of the mouth heal very quickly, and our aim should be to keep the number of harmful germs in the mouth so reduced that they can produce no injurious effect. If this be not done decay of the teeth may set in or progress more rapidly, the gum may become affected with Rigg's disease (pyorrhea alveolaris), and at times the germ may gain access through these places of entry to the heart, kidney or joints and cause serious disease. A tooth with an abscess on its root (an ulcerated tooth) may cause this trouble, and unclean false teeth and plates may also bring about disease.

Again, the author has known patients who, suffering for years from diarrhea and other digestive disturbances, were cured by having their mouths put in good condition. Every patient whose mouth and teeth are not in perfect order should have them attended to as soon as his physician thinks it advisable.

Once in order the teeth should be inspected at least every six months by a competent dentist, and the patient should be scrupulous in his care of them. It is said that "a clean tooth never decays" and "a lazy tooth in time becomes a rotten one." From this the importance of suitable food and a proper tooth toilet can readily be seen.

Foods which necessitate considerable chewing

are of much benefit to the teeth and should be eaten, as such mastication would in itself help cleanse and so greatly preserve the teeth.

But for most of us this is not or cannot be followed out so completely as to do away with other methods of cleansing. Simple rinsing of the mouth with water is helpful but not sufficient, and a tooth-brush, with bristles as stiff as the individual can stand, and shaped after the form of the so-called prophylactic brush, should be used at least twice a day (night and morning) for two minutes, and if possible after each meal. The brush should be placed against the teeth and gums with the bristles resting on the gums, and then turned in a rotatory manner so that the bristles pass lightly over the edges of the gums, enter into the spaces between the teeth, cover the surface of the teeth and so clean parts that the bristles do not reach in the ordinary methods. This procedure must, of course, be modified to cleanse the inner as well as the grinding surfaces of the teeth. It is especially important to have the teeth clean and free from food before going to bed as most of the decay takes place during sleep. According to Jones, candies, sugar, crackers, cake, pastry, bread will all decay the teeth if allowed to remain on their surfaces. Warm water should then be forced between the teeth and dental floss passed gently between them. The tooth-brush should

always be dry when put in use, and it is often advisable to use several brushes in rotation. They should hang in the sunlight when not in use. The advice given to patients to keep their tooth-brushes in a weak germicidal solution may help to destroy the teeth as well as the germs upon the bristles. Immersion in such a solution may be carried out when three or four brushes are kept in use and dried before using.

The question of a good mouth-wash has long been discussed, and experts have said a good mouth-wash should be non-poisonous, neutral (in reaction), non-corrosive, germicidal, pleasant to taste and smell and refreshing. Patients, however, should not get the idea that any mouth-wash can kill the tubercle germs in the mouth. It has been held, and many still hold, that an alkaline alcoholic solution is excellent for the mouth and teeth, but recent work has cast some doubt upon this. In fact, Prof. Gies advocates the use of fruit juices or vinegar diluted with 2 or 3 parts of water (to suit the individual taste), instead of alkaline dentifrices or mouth-washes, and in some patients they may be useful. The problem is still, like many others in medicine, unsettled, and the patient should seek the advice of his dentist or physician for a suitable formula. As a rule the formula prepared by the author and druggists at the Trudeau Sanatorium is good but not suitable for everyone. It follows:

Ol. eucalypti	♏ 30
Ol. gaultheriæ	♏ 36
Mentholis	grs. 20
Thymolis	drs. 1
Extract baptisiæ fluidi	drs. 3
Acid benzoic	oz. ½
Sodii bicarbonatis	oz. 1
Alcohol	oz. 48
Aquæ	oz. 80

Only a part of this should be made up. For use it should be diluted freely. Too free use of tooth powders should not be made. The proper care of the teeth should be begun early and no public health measure should be more warmly welcomed and upheld than the introduction into the public schools of the dental hygienist who not only teaches dental hygiene but cleans the children's teeth and refers those who require it to the dentist.

XXV

ON SUGGESTIONS FOR PATIENTS

"In pulmonary tuberculosis the notes of personal experience mature too late and cannot be discounted."

It has been thought wise to reprint the following summary of suggestions for patients. The explanations of these suggestions have been given elsewhere.

Food

Eggs—2 to 6 a day
Milk—2 to 6 glasses
Meat (at 1 or 2 meals)
Lunches—10.30, 3.30, 9, when ordered
No alcohol

Baths

Warm, at least one a week
Cold sponge to the waist at least every morning

Air

Eight to ten hours outside
Windows open at night
Avoid draughts
Avoid crowded rooms

Expectoration

Use sputum box
Cloths not to be used, except as directed

Bed

Nine to ten hours in bed
Sleep out of doors or in tent, except in winter
No draughts on head

Sun

Head out of it on warm days

Cough

Control
Hold cheesecloth in front of mouth
Use second cheesecloth as handkerchief

Clothes

Not too much
Use wraps
Never get overheated
Never get chilly

Colds

Stay in bed. Report

Daily Routine

7.30	Awake. Take temperature
	Milk (hot if desired) if necessary
	Warm water for washing. Cold sponge
8.00	Breakfast
8.30	Out of doors in chair or on bed
10.30	Lunch when ordered
11–1	Exercise or rest as ordered
1–2	Dinner. Indoors not over one hour, less if possible
2–4	Rest in reclining position. Reading, but no talking allowed. Take temperature
3.30	Lunch when ordered
4.00	Exercise when ordered
6.00	Supper
7.00	Out on good nights
8.00	Take temperature
9.00	Lunch and bed
	Once or twice a week a hot bath, followed by cold sponge

Always stop any medicine that upsets stomach.

A hemorrhage does not mean that you are hopelessly worse or cannot be cured.

Remember that the porch is the most essential feature of the house.

XXVI

ON FOOD VALUES

THE following table indicates roughly the amount of protein and the calories in some of the foods most frequently eaten by patients with tuberculosis.

	Protein in grams	Calories
Soups—clear		
Beef broth, 4 ounces	5.0	32
Bouillon, 4 ounces	2.6	13
Consommé, 4 ounces	3.0	14
Chicken, 4 ounces	13.0	72
Soups—creamed		
Asparagus, 4 ounces	3.0	114
Celery, 4 ounces	3.0	116
Corn, 4 ounces	4.0	140
Pea, 4 ounces	6.0	162
Potato, 4 ounces	3.0	135
Tomato, 4 ounces	3.0	126
Gruels		
Arrowroot, 6 ounces	8.0	225
Barley, 6 ounces	6.0	140
Cornmeal, 6 ounces	4.0	90
Oatmeal, 6 ounces	9.0	200
Cracker, 6 ounces	11.0	290

	Protein in grams	Calories
Beverages		
Whole milk, 8 ounces	7.2	150
Skimmed milk, 8 ounces	7.5	84
Beef juice, 4 ounces	6.0	30
Cream, ½ ounce	0.74	50
Tea, 8 ounces	3.0	150
Coffee, 8 ounces	3.0	150
Cocoa, 8 ounces	9.0	280
Lemonade, 8 ounces	0.1	174
Grape juice, 1 ounce	0.1	20
Buttermilk, natural, 8 ounces	6.0	80
Buttermilk, artificial	7.0	110
Chocolate milk shake	13.0	400
Whey, 4 ounces	1.0	28
Koumiss, 4 ounces	3.6	70
Egg white, 1	4.0	17
Gelatin, 1 ounce	27.0	110
Apple sauce, 3 ounces	0.25	200
Honey, ½ ounce	0.1	100
Orange juice, 1 ounce	0.0	13
Prepared Foods and Oils:		
Olive oil, ½ ounce	0.0	120
Cod-liver oil, ½ ounce	0.0	120
Mellin's Food, 1 ounce	2.0	108
Eskay's Food, 1 ounce	1.5	110
Nestlé's Food, 1 ounce	3.0	110
Fairchild's Food, 1 ounce	0.34	105
Condensed milk (sweetened), ½ ounce	1.0	19
Meats, Fish, etc.:		
Roast beef, fat, 1 slice	22.0	357
Roast beef, lean, 1 slice	23.0	110
Lamb chop, 1	22.0	367
Turkey, 1 slice	28.0	285

	Protein in grams	Calories
Meats, Fish, etc.:		
Chicken:		
Capon, 1 slice	27.0	218
Creamed on toast (2 heaping tbsp.)	16.0	273
Fricasseed, 1 slice	17.0	189
Roast, 1 slice	32.0	181
Ham, roast, 1 slice	28.0	210
Veal, roast, 1 slice	21.0	97
Salmon (a helping)	20.0	198
Smelts	2.0	28
Brook trout (a helping)	11.0	57
Oysters, 6 raw	5.0	44
Clams, 6	7.0	47
Bacon, 1 slice	3.0	190
Sardines (canned):		
American	21.0	300
Foreign	22.0	500
Vegetables:		
Potatoes, white, boiled, medium size	4.0	140
Potato chips, 3 heaping tablespoonfuls	3.4	295
Green peas, 3 large tablespoonfuls	6.0	150
Mushrooms (boiled), 2 large on toast	4.0	150
Corn (canned), 2 large tablespoonfuls	3.0	100
Macaroni, baked with cheese, 2 large tablespoonfuls	19.0	450
Rice (boiled), 1 large tablespoonful	3.0	112
Beets, 2 large tablespoonfuls	1.6	30
Cabbage, 3 large tablespoonfuls	0.6	5
Cauliflower, 2 large tablespoonfuls	1.0	8
Celery (raw), 3 small stalks	0.5	8
Cucumbers (raw), 8 thin slices	0.4	9
Parsnips, 4 slices	0.22	10
Turnips, 2 large tablespoonfuls	0.45	6

	Protein in grams	Calories
Salad Dressings:		
French dressing, ¼ ounce	0.0	74
Mayonnaise, 1 tablespoonful	0.26	187
Hollandaise, 2 tablespoonfuls	1.8	170
Bread, Cake, Pies, etc.:		
Bread, white, 1 slice	3.0	90
Whole wheat, 1 slice	4.0	106
Graham, 1 slice	3.0	100
Cake, frosted, 1 slice	2.0	150
Layer, 1 slice	4.0	250
Gingerbread, 1 slice	3.0	220
Pies, ⅙ piece	4.5	250
Bread pudding, 2 large tablespoonfuls	6.0	225
Custard pudding, 2 large tablespoonfuls	7.0	180
Fruits:		
Bananas	1.5	127
Grapefruit, ½ large	2.0	139
Grapes	1.5	112
Oranges, 1	1.5	96
Figs, 10 large	8.0	633
Prunes, 10 large	4.0	525
Dates, 10 large	2.0	266
Apricots, 10 large	4.0	228
Apple	0.45	72
Miscellaneous:		
Nuts, 10 large	4.0	200
Eggs, 1, boiled one minute	6.7	75
Butter, ½ ounce	0.0	120
Cheese (American), 1 cubic inch	5.7	91
Sugar of milk, 1 teaspoonful	0.0	15
Sugar (⅛ ounce), 1 teaspoonful	..	15
Domino (½ size)	..	18
Jack Frost tablet	..	24
Cut	..	29

	Protein in grams	Calories
Miscellaneous:		
Caramel		50
Chocolate peppermint		50
Marshmallow		13.4
Cream mint		32
Gum drop		35
Junket, 4 ounces	4.0	75
Oatmeal (boiled), 2 large tablespoonfuls	3.0	63
Calf's-foot jelly, 1 ounce	2.2	45
Ice-cream, 2 large tablespoonfuls	5.0	190

SUMMARY

"The physician must not only be prepared to do what is right himself but also to make the patient, the attendants and externals coöperate."

It is well for every patient to understand the nature of this disease, and what his problem is. It is no easy problem and a large percentage of patients fail in the attempt to solve it, either on account of ignorance or of wilfulness. The strong character recognizes the necessity for certain action and pursues it often to successful termination. The weak character vacillates, heeds advice from those who know little of his condition, and often care less, and ofttimes follows this advice until he has lost months of valuable time.

The disease, tuberculosis, is the most widespread in the world; it occurs everywhere, you might say, that man lives, from the north polar regions to the equator and south to the south pole. It is more prevalent, however, in certain regions than in others. All races are prone to it. Some of them, especially those that live out of doors, do not have it until they begin to live indoors. The American Indian, for instance, is more susceptible to it since he has begun to adopt the ways of civilization. The Arabs and Bed-

ouins and some of the African tribes do not get it until they begin to live in houses and towns.

The disease is caused by a tiny, microscopic plant. It is called, as you know, the tubercle bacillus. It is not green, like the fern in the window, but is very much the color of a wall (buff), and is shaped just like a lead-pencil. It is so small that through the hole made by a pin in a sheet of paper a thousand of these little germs could pass, side by side, without touching each other and without touching the sides of the hole. Consequently, on a particle of dust, such as we see floating in a ray of sunshine, many of these little germs can easily ride as in a chariot, and thus we may breathe them into our lungs.

A curious thing about this little plant is that it differs from most other plants in two very important particulars, which everyone ought to remember. All ordinary plants, geraniums, for instance, need sunshine and fresh air. This plant, this tubercle bacillus, cannot live in sunshine and it cannot live in fresh air. Give it either all the fresh air that it can get (for example, place it in a room with the windows open), or put it in the sunshine, and it will die. Sunshine will kill the tubercle bacillus, if not in a thick mass of sputum, in four or five hours, and possibly in less time. Of course, in a dark corner of the room, where direct sunlight never penetrates, an exposure for two or three or more days to the indirect sunlight may be required to kill it, but such

light will kill it eventually. In other words, light is one of the best germicides, and it will surely kill these germs. If, on the other hand, the tubercle bacillus is put in a dark place, but given plenty of fresh air, it will also die. It cannot stand either air or light. Thus, in a well-lighted and ventilated room the tubercle bacillus is very speedily killed.

This leads me to say that tuberculosis has long been considered a house disease. This means that it is practically never contracted out of doors, but always in the house. The tubercle bacillus can live out of doors only a short time and practically never infects anybody out of doors. For instance, if a person expectorates on the pavement and someone walks in it and takes it into the house on his shoes, or brings it in on her skirts, it gets on the carpet and dries. The maid then sweeps the carpet with a broom, breaking up the sputum into fine dust, which settles on the window sills, furniture, etc. The tubercle germ has no power of locomotion. It can no more move from place to place than a geranium or a tree. It depends on many outside agencies mentioned in this chapter to get from one place to another. A further curious thing is, that as long as it is moist, it can never get into the air except when subjected to a violent blast of air, as we shall see later. The great object, then, is to keep this germ moist. For this reason, "moist"

sweeping should always be employed; that is, moist tea leaves or moist sawdust should be sprinkled on the floor, or a moist bag placed over the broom. This collects the dust so that it can be burned and does not allow it to fall upon the furniture, where the usual practice is to stir it up once more with a dry duster. This gives the germs one more chance. Here, too, "moist" methods should be employed and the duster moistened with oil for furniture, with water for paint. The duster should then be boiled. By far the best cleaning method is the vacuum system, which I hope and believe will be, at some time, universally used.

Tuberculosis is almost always contracted by means of these particles of sputum. More recently attention has been called to the danger of the contamination of balls, tops, marbles and other playthings by sputum containing tubercle germs. Children may soil their hands with this sputum, and in a few minutes convey the germs upon their toys or hands into their mouths. We may breathe them in or they may be swallowed, but eventually they go to our lungs. They get into our bodies practically always by these routes. Usually they come from someone who has been careless with his sputum. All adults have contracted this disease from somebody who has been ignorant or careless. The chances are not one in ten thousand that an adult has gotten it from milk or from food or,

in fact, in any other way than from a person who has tuberculosis. If there is a tuberculous patient in the house, and he or she is careless about the disposal of sputum, it is easily seen how the infection comes about. If patients are careless about spitting on the streets of the cities, others may walk in it and track it into their houses.

Another method by which tuberculosis can be contracted is a way that a great many people do not realize. If a person coughs in front of a pane of glass or in front of a looking-glass, one will find that the glass is covered with fine spray or droplets of sputum, and if he coughs in his hand, it is immediately sprayed with these fine particles of sputum. These droplets may contain tubercle germs. They will carry for a distance of about four feet from a patient and may remain suspended in the air sometimes for as long as an hour. So it is easily seen that if a person who is in a poorly ventilated room coughs and moves about without covering his mouth, he could in time infect the whole room. He will be surrounded by a halo of these droplets, each of which may contain tubercle bacilli. Patients do not realize this. All a patient has to do to eliminate this danger is to hold a cloth or a piece of tissue paper in front of his mouth to catch the spray. The tubercle bacillus cannot get through the cloth or paper and he is no source of danger

to anybody else. He *must* cover his mouth when he coughs.

Another lesson that he can draw from this fact is that if anybody else coughs without covering his mouth, he should not go near him. One can catch pneumonia, grippe, bronchitis, colds and a number of other diseases of the respiratory tract by this means. It is a simple thing to cover one's mouth, and it is not asking too much of patients to request them to cover their mouths when they cough. Sometimes patients cannot cover their mouths in time; they cough occasionally when they do not know it is coming; but if a man does not make an honest, conscientious effort to cover his mouth when he coughs, he should be avoided and ostracized. Covering the mouth with the hand alone is a lazy, dirty and dangerous practice. A piece of cheese-cloth or tissue paper as stated above should be used and in any case the hands washed frequently. The only proper way to take care of sputum is to burn it, and for that reason no one should expectorate into the bowls or sinks, but always into sputum boxes which can be burned.

Adults may get tuberculosis from food, but they very, very rarely contract it from milk. Children, on the other hand, do get it from milk. We have heard that the cattle germs (bovine tuberculosis germs) do not cause tuberculosis in man, which, in a broad sense, is true, but children are prone to the disease from this and other

sources. It has been estimated that 122,000 persons die annually from tuberculosis in the United States, and that 8 per cent, or 9760, of these, are children who die from the tuberculosis germ found in cattle. These facts are serious enough to make us all realize that cattle tuberculosis must be stamped out. Among 467,694 rejections for military service (the draft) 8.67 per cent were due to pulmonary tuberculosis and 0.88 per cent to tuberculosis of other parts. The rejection of 44,684 men between nineteen and thirty-one years of age gives some idea of how many patients with tuberculosis there must be. The Pasteurization of milk in large cities like New York, and the sporadic attempts to eradicate tuberculosis from the cows in dairies, have reduced, and will unquestionably further reduce, the number of deaths from the bovine tubercle bacillus.

The question of heredity is one that concerns all of us more or less, but tuberculosis in man, we may say, for practical working purposes, is unknown as a hereditary disease. It occurs so rarely that we can disregard it, as when a child is born with the disease it quickly succumbs to it. What does happen, though, is that a predisposition to the disease may be inherited. The children of tuberculous parents may, in fact, have less resistance to all diseases. Consequently these children should be protected more carefully than other children. This simply means that

rules such as those I have mentioned and others must be carried out. The house must be well lighted and ventilated; the floors well cleaned; and care must be taken to see that the food supply is of good quality and adequate. A person cannot get the disease unless he gets the tubercle bacillus into his body.

There are two forms of tuberculosis: The one that patients have, which is developed tuberculosis, which we call clinical tuberculosis, and the other a form that 75 per cent of the people living, for example, in New York City have, nonclinical or undeveloped tuberculosis. They have the tubercle bacillus in their bodies, they might react to some of the tests for tuberculosis, but they will never know that they have tuberculosis if they take care of themselves. Just as a man should take care of himself to keep from developing it, avoiding overwork, worry, disease and a great many other things which will bring it on, so, when he gets well, these same things will bring on fresh activity of the disease if he does not avoid them. These are vitally important facts for everyone to know.

The cure of tuberculosis is the point in which we are now chiefly interested. Most patients think they can leave work for two or three months and get perfectly well. That is entirely wrong. A patient may leave home or quit work for five or six months, which is a very short time, and he simply gets on the road to recovery. He has to

go home and finish it up by living carefully for three or four years. I am firmly convinced that tuberculosis is not cured for three or four years, and that the reason so many people die is because they do not realize that fact. They think that after two or three months, because they feel better and look better and have gained a great deal of weight, they can go home or return to their old ways of living; but they cannot do it, and sooner or later, if they do return to the same life with its numerous and hard duties, they are going to relapse, and the second attack is harder to treat than the first. For this reason one must not get the idea that tuberculosis is an easy thing to get rid of. Thirty-eight per cent of all patients who have been treated at the Trudeau Sanatorium have died, and about 80 per cent of these from tuberculosis. I speak of these things because a great many people have the idea that the cure of tuberculosis is child's play, when really it is one of the most difficult problems that anyone has ever had to face. To get well from tuberculosis means that a patient must pay attention to every little detail. He must watch and make no mistakes, for these often prove fatal. Many small things may not seem essential to him, but they are, and recovery really depends upon paying attention to little details. A person who is careless and slack about details will be slack about great things. It was unnecessary for many of the patients mentioned to have died, and it is for

this reason that we are endeavoring to teach the dangers that beset patients early and late, so that they may plan wisely to avoid them.

Regarding the question of food, I am not quite in accord with some other men. I do not believe that the main thing for a patient to do is to get to be such a mass of fat that he can hardly walk around, with little or no strength and loss of breath every time he walks up hill. I want my patients to gain up to their normal weight and to go a little beyond, but I want them to gain proportionately in strength. An important thing today is to realize that overeating is just as dangerous as undereating, that the proper way is to eat as little as a patient can to maintain his strength. The less he can eat and continue to gain, the better. Put too much into his body and it will ferment and decompose and thus lower the body's resisting powers. Many patients suffering from tuberculosis are affected by overeating. The medical profession in general has realized the importance of air, of good food, but not many physicians have given attention to the danger of overeating, which only clogs the system and prevents the best results. Give an automobile too much gas, and the engine is choked; or overstoke a steam engine, and its efficiency is diminished. So find out the best amount to eat to get the best work from the body. Large gains are not necessary. To eat as little as will enable him to hold his weight and strength is the important thing.

We have come to believe that the general public knows how important good food is, realizes that fresh air is a necessity, but is still wholly at sea in regard to the danger and value of rest and exercise. Strychnine and arsenic are valuable drugs, but not many would care to experiment upon themselves to find out the proper dose. In pulmonary tuberculosis it requires far more experience to decide the "dose" of exercise than is necessary in the use of arsenic or strychnine. More patients fail to recover their health from failure to appreciate the danger that lurks even in gentle exercise than from any other cause.

All patients will fall into one of three classes: First, those who will never again be able to do much work. Second, those who will be able to do nothing for months or even years. The third group includes those patients who, at the end of six or more months, are going to be able to return to work, many of them to their former occupations. For them an endeavor should be made to supply exercise approximating more or less nearly what they must do on their return to work. This enables them to get their muscles in training for their work. We believe that no man or woman should return to his or her work who cannot take a great deal more exercise while still under treatment than will be required at work.

Some patients pass unexpectedly and at times

quickly from one class to the other, for recovery from tuberculosis does not follow a gentle ascent toward complete arrest, but leaps from one level which has been maintained for possibly some months to another in a few weeks.

The only way we can attack tuberculosis is by raising the body's powers of resistance to the highest point and then letting it fight against the disease. That is what I mean when I say it takes four years to get over tuberculosis. We cannot cure a patient in six months, but we can get him in such shape that when he returns home he will know how to take the right care of himself and to keep his body in such shape that it cannot only hold its own against the tubercle germ, but also fight against it and in three or four years overcome it. It does take that length of time and it does require that kind of treatment.

The treatment can be divided into two parts. The first I like to consider as similar to a college course. Now a college is a place where men and women go to have set out for them each day certain tasks which they must do. They must come every day to the classroom for a certain number of hours to recite upon, for instance, so much history, philosophy, Greek or biology. My duty to my patients in this part of their "course" is to teach them all I can, all that I know, about what they should do and why. When they have learned this, when they

have corrected their mistakes and realize the problem they have to face, I feel they can pass into the second part of the treatment, which I like to compare to a university. A university is conducted very differently from a college. A university is a place where a man can pursue original work, where he has a certain problem given him to work out, which he can do with the assistance of the professors. If a difficulty arises he consults them, and they give him help and aid in solving his problem. So it is with patients. They will have to solve this problem for themselves. We cannot make them get well; all we can do is to give them help. We want them to think over the whole thing seriously and earnestly, and if anything comes up which they do not understand, to come and talk it over. We want them to realize that the matter is largely in their own hands. We can watch them for six months and send them to work; and then, in a week, a day, an hour, they can upset all we have done. It is a mere waste of time to try to make a man take care of himself. You can lead a horse to water but you cannot make him drink, nor can you make a person get well. You can give him every chance, but beyond that there is little to be done. Constant care, day in and day out, must be the watchword for the next four or five years for all of them, and if they do that, we think the vast majority of them will be in excellent shape at the end of that time.

In every community, in every village, city, or State, it is necessary to have certain rules to govern the inhabitants of these places in their conduct toward one another. Every institution needs to have a few simple rules. The patient must carry on the spirit of the place and hand it down to others that come after him. If he does not, he fails to get the best out of his stay. Every time he does not understand some rule, if he will talk the matter over with some one in authority it will be explained. These rules must be carried out, not only in the letter, but in the spirit.

After all, the most important thing is to be able to control one's self. If a man does not develop self-control while he is "curing," so that when he is asked to do things he knows he should not, and to which he cannot say no, then his time has been lost. Unless a patient can say no when the occasion arises, his chances for getting well are very slight. He can tear down in one day or in an hour what it has taken him many months to build up. A man often dies on account of his disposition rather than on account of his disease.

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